APPENDIX E: Pertinent Correspondence

LAKE WORTH INLET
Palm Beach Harbor

Pertinent Correspondence
Table of Contents

Attachment 1: Environmental Correspondence

Attachment 2: Sponsor and Pilot Correspondence

Appendix E: Pertinent Correspondence
Attachment 1: Environmental

LAKE WORTH INLET
Palm Beach Harbor

Lake Worth Inlet, Palm Beach Harbor

Pertinent Correspondence

Pertinent Correspondence
Table of Contents

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Scoping Correspondence

December 6, 2007

Planning Division
Environmental Branch

To Whom It May Concern:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is gathering information to define issues and concerns that may be associated with expansion of Lake Worth Inlet (Palm Beach Harbor), Florida

A Feasibility Study is being undertaken to determine if the authorized project should be modified. During the feasibility study, environmental considerations will be addressed in an Environmental Impact Statement. Alternatives that are being considered include no action, widening and deepening of existing channels and turning basin modifications, or a combination of alternatives (see enclosed Figure).

Significant issues that are anticipated include concern for nearshore and offshore hard bottom communities, fisheries, threatened and endangered species, sea grasses, marine mammals, migratory birds, and water quality. For additional information, see the enclosed Notice of Intent to prepare a Draft Environmental Impact Statement.

Preliminary geotechnical reports indicate that blasting may not be necessary to achieve the proposed inlet expansion. Disposal options being considered include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if sufficient beach compatible material), artificial reef (if sufficient suitable rock), and any other disposal or beneficial use options that may become available.

Letters of comment or inquiry should be submitted within 45 days from the date of this letter to the letterhead address, attention of Ms. C. L. Brooks, Planning Division. Your concerns or comments may also be communicated in one of several public and agency scoping meetings that will be conducted on this project. The first public and agency scoping meeting will be held January 9, 2008, at 3:00 p.m., Port of Palm Beach, One East 11th Street, Riviera Beach, Florida, 33404,. Additional information and project updates can be obtained from website: http://www.portofpalmbeach.com/feasibility_study.htm

Sincerely,

Marie G. Burns
Acting Chief, Planning Division

Enclosures

Figure 2. Port of Palm Beach Proposed Expansion Alternatives

BILLING CODE: 3710-AJ

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

COOPERATING AGENCY: Port of Palm Beach District, Riviera Beach, Florida

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps (Corps) of Engineers intends to prepare a Draft Environmental Impact Statement (EIS) for expansion, including widening and deepening of existing channels and turning basins in Lake Worth Inlet (Palm Beach Harbor). The project is a cooperative effort between the U.S. Army Corps of Engineers (lead Federal agency) and Port of Palm Beach District (non-Federal sponsor and cooperating agency).

ADDRESSES: Ms. Catherine L. Brooks, U.S. Army Corps of Engineers, Jacksonville District, Planning Division, Environmental Section, P.O. Box 4970, Jacksonville, FL 32207.

FOR FURTHER INFORMATION CONTACT: Catherine L. Brooks at (904) 232-2130.

SUPPLEMENTARY INFORMATION: Authority for the proposed study was received under the House Resolution of June 25, 1998. An expedited Reconnaissance Report completed in 2001 by the Corps, concluded based on preliminary findings, there was a federal interest in pursuing harbor improvements.

Alternatives: The project's expansion alternatives include no action, creation of channel flares, wideners, deepening, turning basin, or a combination of the considered alternatives. Alternatives being considered for disposal of dredged material include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if there is sufficient beach compatible material), artificial reef (if there is sufficient suitable rock) and any other disposal or beneficial use options that may become available.

Issues: The EIS will consider impacts on coral reefs and other hardbottom communities, sea grasses, protected species, shore impacts, health and safety, water quality, aesthetics and recreation, fish and wildlife resources, cultural resources, energy conservation, socio-economic resources, navigation, and other impacts identified through scoping, public involvement and interagency coordination.

Scoping: The scoping process will involve Federal, State, County and municipal agencies and other interested persons and organizations. A public and agency scoping meeting will be held on January 9, 2008, at 3:00 p.m. at the Port of Palm Beach, One East 11th Street, Riviera Beach, FL, 33404.

Public Involvement: We invite the participation of affected Federal, State and local agencies, affected Native-American Tribes, and other interested private organizations and individuals. In addition to the agency and public scoping meeting on January 9, 2008, and receipt of written comments at various stages of the Feasibility Study, there will be a public meeting on the Draft Environmental Impact Statement following its preparation. The date, time, and location will be announced.

Coordination: The proposed action is being coordinated with the U.S. Fish and Wildlife Service (FWS) and NOAA-National Marine Fisheries Service (under Section 7 of the Endangered Species Act) and the Wildlife Coordination Act (FWS only). The proposed action is also being coordinated with the Florida State Historic Preservation Officer, the U.S. Coast Guard, and the U.S. Environmental Protection Agency.

Other Environmental Review and Consultation: The proposed action would involve evaluation for compliance with guidelines pursuant to Section 404(b)(1) of the Clean Water Act, water quality certification (application to the State of Florida) pursuant to Section 401 of the Clean Water Act, certification of state lands, easements, and rights-of-way, determination of Coastal Zone Management Act Consistency, and the use of the Ocean Dredged Material Disposal Site for Palm Beach
Harbor pursuant to the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act).

Agency Role: As the cooperating agency, non-Federal sponsor and leading local expert, the Port of Palm Beach will provide information and assistance on the resources to be impacted, mitigation measures and alternatives. Other agencies having either regulatory authority or special expertise may also be invited to become a cooperating agency in preparation of the EIS.

Draft EIS Preparation: It is estimated that the Draft EIS will be available to the public by November 2008. As the study and EIS develop, additional information will be posted under Palm Beach County on the Jacksonville District's Environmental Documents web page at: *http://planning.saj.usace.army.mil/envdocs/envdocsb.htm*. The status of any

Florida Department of Environmental Protection application submitted for permit of this action will be posted on the internet at: http://www.dep.state.fl.us/beaches/permitting/permits.htm.

December 6, 2007

DATE

MARIE G. BURNS
ACTING CHIEF, PLANNING DIVISION

DEPARTMENT OF DEFENSE

Department of the Army

Army Science Board Plenary Meeting

AGENCY: Department of the Army, DoD.

ACTION: Notice of open meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act of 1972 (5 U.S.C., Appendix, as amended), the Sunshine in the Government Act of 1976 (U.S.C. 552b, as amended) and 41 Code of the Federal Regulations (CFR 102–3. 140 through 160, the Department of the Army announces the following committee meeting:

Name of Committee: Army Science Board (ASB).

Date(s) of Meeting: January 15 & 16, 2008.

Time(s) of Meeting: 0800–1700, January 15, 2008.

0800–1600, January 16, 2008.

Place of Meeting: University of Maryland University College (UMUC) Inn and Conference Center, Adelphi, MD. 3501 University Boulevard E, Adelphi, MD.

FOR FURTHER INFORMATION CONTACT: For information please contact Ms. Sharon Harvey at *sharon.harvey1@us.army.mil* or (703) 604–7466 or Mr. Wayne Joyner at *wayne.joyner@saalt.army.mil* or (703) 604–7490.

SUPPLEMENTARY INFORMATION: *Proposed Agenda:* The Army Science Board will meet on January 15 & 16, 2008 at the University of Maryland University College (UMUC) Inn and Conference Center. Purpose of the meeting on both days is to allow each study; Generation Force Functional Census, Institutionalized Lifecycle Management of Innovation Organizations, Information Operations, and Persistent CSR to collect data and hold discussions as it relates to each individual study.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. E7–24151 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army

Conservation Measures for Transfer of Federal Land at Parks Reserve Forces Training Area, Dublin, CA

AGENCY: Department of the Army, DoD.

ACTION: Notice of requirement.

SUMMARY: Pursuant to the proposed conservation measures found within the U.S. Fish and Wildlife Service Biological Opinion #1106F1752 dated December 18, 2006, acceptance of any portion of the 170.5-acre land exchange property located at Parks Reserve Forces Training Area (PFRTA), Dublin, CA is conditioned on the developer engaging the U.S. Fish and Wildlife Service in Section 7 or Section 10 Endangered Species Act consultation prior to the development of the aforementioned land. This consultation requirement is because of the potential loss of habitat and potential for take of the endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*), the threatened California red-legged frog (*Rana aurora draytonii*), and the threatened California tiger salamander (*Ambystoma californiense*).

ADDRESSES: Public Affairs Office, U.S. Army CTSC, Camp Parks, 790 5th Street, Dublin, CA 94568–5201.

FOR FURTHER INFORMATION CONTACT: Amy Phillips, (925) 875–4298, *amy.phillips@usar.army.mil.*

SUPPLEMENTARY INFORMATION: A Request for Proposal (RFP) regarding the 170.5-acre land exchange property will be available upon request.

Kevin R. Riedler,

Colonel, U.S. Army, Commanding.

[FR Doc. E7–24193 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

COOPERATING AGENCY: Port of Palm Beach District, Riviera Beach, Florida.

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps (Corps) of Engineers intends to prepare a Draft Environmental Impact Statement (EIS) for expansion, including widening and deepening of existing channels and turning basins in Lake Worth Inlet (Palm Beach Harbor). The project is a cooperative effort between the U.S. Army Corps of Engineers (lead Federal agency) and Port of Palm Beach District (non-Federal sponsor and cooperating agency).

ADDRESSES: Ms. Catherine L. Brooks, U.S. Army Corps of Engineers, Jacksonville District, Planning Division, Environmental Section, P.O. Box 4970, Jacksonville, FL 32207.

FOR FURTHER INFORMATION CONTACT: Catherine L. Brooks at (904) 232–2130.

SUPPLEMENTARY INFORMATION: Authority for the proposed study was received under the House Resolution of June 25, 1998. An expedited Reconnaissance Report completed in 2001 by the Corps, concluded based on preliminary findings, there was a federal interest in pursuing harbor improvements.

Alternatives: The project's expansion alternatives include no action, creation of channel flares, wideners, deepening, turning basin, or a combination of the considered alternatives. Alternatives being considered for disposal of dredged material include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if there is sufficient beach compatible material), artificial reef (if there is sufficient suitable rock) and any other disposal or beneficial use options that may become available.

Issues: The EIS will consider impacts on coral reefs and other hardbottom communities, sea grasses, protected species, shore impacts, health and safety, water quality, aesthetics and recreation, fish and wildlife resources, cultural resources, energy conservation, socio-economic resources, navigation, and other impacts identified through scoping, public involvement and interagency coordination.

Scoping: The scoping process will involve Federal, State, County and municipal agencies and other interested persons and organizations. A public and agency scoping meeting will be held on January 9, 2008, at 3 p.m. at the Port of Palm Beach, One East 11th Street, Riviera Beach, FL 33404.

Public Involvement: We invite the participation of affected Federal, State and local agencies, affected Native-American Tribes, and other interested private organizations and individuals. In addition to the agency and public scoping meeting on January 9, 2008, and receipt of written comments at various stages of the Feasibility Study, there will be a public meeting on the Draft Environmental Impact Statement following its preparation. The date, time, and location will be announced.

Coordination: The proposed action is being coordinated with the U.S. Fish and Wildlife Service (FWS) and NOAA-National Marine Fisheries Service (under Section 7 of the Endangered Species Act) and the Wildlife Coordination Act (FWS only). The proposed action is also being coordinated with the Florida State

Historic Preservation Officer, the U.S. Coast Guard, and the U.S. Environmental Protection Agency.

Other Environmental Review and Consultation: The proposed action would involve evaluation for compliance with guidelines pursuant to Section 404(b)(1) of the Clean Water Act, water quality certification (application to the State of Florida) pursuant to Section 401 of the Clean Water Act, certification of state lands, easements, and rights-of-way, determination of Coastal Zone Management Act Consistency, and the use of the Ocean Dredged Material Disposal Site for Palm Beach Harbor pursuant to the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act).

Agency Role: As the cooperating agency, non-Federal sponsor and leading local expert, the Port of Palm Beach will provide information and assistance on the resources to be impacted, mitigation measures and alternatives. Other agencies having either regulatory authority or special expertise may also be invited to become a cooperating agency in preparation of the EIS.

Draft EIS Preparation: It is estimated that the Draft EIS will be available to the public by November 2008. As the study and EIS develop, additional information will be posted under Palm Beach County on the Jacksonville District's Environmental Documents web page at: *http://planning.saj.usace.army.mil/envdocs/envdocsb.htm*. The status of any Florida Department of Environmental Protection application submitted for permit of this action will be posted on the internet at: *http://www.dep.state.fl.us/beaches/permitting/permits.htm*.

Dated: December 6, 2007.

Marie G. Burns,

Acting Chief, Planning Division.

[FR Doc. E7–24150 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–AJ–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

U.S. Army Corps of Engineers (Corps) Regulatory Guidance Letter (RGL) 07–02: Exemptions for Construction or Maintenance of Irrigation Ditches and Maintenance of Drainage Ditches under Section 404 of the Clean Water Act (CWA)

AGENCY: U.S. Army Corps of Engineers, Department of Defense.

ACTION: Notice of availability.

SUMMARY: The Corps issued RGL 07–02 to further explain the regulatory exemptions for construction or maintenance of irrigation ditches and maintenance of drainage ditches consistent with Section 404(f) of the CWA (33 U.S.C. 1251 et seq.) and implementing regulations. Specifically, the RGL clarifies when Section 404(f) exempts from permitting requirements discharges of dredged or fill material into waters of the United States associated with the construction and maintenance of irrigation ditches and maintenance of drainage ditches. The RGL also clarifies how certain terms in the regulations at 33 CFR 323.4 are applied in the context of the Sections 404(f) exemptions, including irrigation ditch, drainage ditch, construction, and maintenance. In addition, the guidance provides a framework for determining the applicability of the exemptions and the recapture provision, consistent with the CWA and implementing regulations. This RGL was effective July 4, 2007.

DATES: Comments must be received on or before February 11, 2008.

ADDRESSES: Submit your comments, identified by docket number COE–2007–0038, by one of the following methods:

- *http://www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *E-mail: Kimberly.S.McLaughlin@usace.army.mil.* Include the docket number, COE–2007–0038 in the subject line of the message.
- *Mail:* 441 G Street, NW., Washington, DC 20314.
- *Hand Delivery:* 441 G Street, NW., Washington, DC 20314. Such deliveries are only accepted during normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to docket number COE–2007–0038. The Corps's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or e-mail. The *www.regulations.gov* Web site is an ''anonymous access'' system, which means the Corps will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to the Corps without going through *www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the Corps recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If the Corps cannot read your comment due to technical difficulties and cannot contact you for clarification, the Corps may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at 441 G Street, NW., Washington, DC 20314. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays.

FOR FURTHER INFORMATION CONTACT: Kim McLaughlin, Regulatory Community of Practice (CECW–CO), U.S. Army Corps of Engineers, Headquarters, 441 G Street, NW., Washington, DC 20314; telephone number: (202) 761–7763; fax number: (202) 761–5096; e-mail address: *Kimberly.S.McLaughlin@usace.army.mil*.

SUPPLEMENTARY INFORMATION:

I. General Information

The Corps is requesting public comment on RGL 07–02, which is available at: *http://www.usace.army.mil/cw/cecwo/reg/rgls/rgl07–02.pdf*.

At the same time, the Corps appreciates that the public has considerable interest in the issues addressed in this guidance. The Corps is particularly interested in hearing from the public regarding their actual experience with implementing the guidance. The Corps is providing a 60-day public comment period, and encourages the public to provide comments informed by actual experience. To assure the public of our commitment to carefully consider their comments, and to address issues that

PUBLIC MEETING
LAKE WORTH INLET FEASIBILITY STUDY

Wednesday, January 9, 2008
Port of Palm Beach
One East 11th Street, Suite 400
Riviera Beach, Florida 33404
3:00 - 5:31 p.m.

DAIS:

Richard McMillen
Marie Burns
Kenneth Dugger
Donald Dies

Lori Baer, Port Director

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P R O C E E D I N G S

- - -

RICHARD McMILLEN: I want to welcome everybody to the first public meeting of the Lake Worth Inlet Feasibility Study. This is one of our first meetings in a series of meetings. And let me dispel some of the fears that some of you may have right now.

You will not be seeing any construction going on or expansion of the Port or channel widening or dredging in the Port facility for at least four to five years. You won't see it tomorrow, you won't see it next year.

This is the first public meeting related to the Port -- not Port facility, but the channel widening of the federal navigation channel, okay?

The reason for our study is because we have some navigational safety issues surrounding our federal channel out there. The vessels are getting longer, they're getting wider. Currently we're having a problem getting those vessels in and out of this inlet right now, particularly the oil vessels, the fuel vessels for the power plant. We have some other cargo that's running into problems.

Our navigation channel is posing some restrictions. It's authorized for 33 feet. It's currently shoaled up to 29 feet. Harbor pilots are restricting the channel to 29 feet and less. And we've continued to experience these types of problems for the last several years, and that's what we're down here for as part of the federal study. And it is a federal study, folks.

The Port Director, Lori Baer, has brought this concern to our table. We have known about it for a while and we've finally been able to get Congress to give us some money and authority to move forward with this study. And that's where we're at right now, starting off with the first public meeting here, okay?

As I mentioned, the reason for looking at this is to address a navigational safety issue getting vessels in and out of the existing projects, okay? In the process of doing so, we'll be looking at deepening, we'll be looking at widening and realigning some of the channel to make it easier and safer for most vessels to get in and out.

The reason for the public meeting is this is part of what we call our NEPA scoping process. NEPA process. NEPA stands for National Environmental Policies Act. It is an act passed by Congress that requires us to go through an exhaustive environmental investigation on any of our federal projects to ensure -- to minimize impact to environments. Okay?

The purpose of the meeting is to solicit your comments. I'd like to say the good, the bad, the ugly, the indifferent, the for, the against, and we'd like all that, but to be more specific as to what your concerns are as we go through this process, okay?

As I mentioned, I once again strongly emphasize that this is a federal process. This isn't a Port process, this isn't a Palm Beach County process, this is the federal process and, as I mentioned, it's very lengthy, trying and full of tribulations as we get to our ultimate goal; and that is, addressing those navigational issues.

As we get ready to move forward here, before we move forward I'd like to state that as part of the federal process, as part of these federal projects we have non-federal sponsors. The federal government doesn't pony up one hundred percent of the bucks for these federal projects. We have to have sponsors that initiated or wanted or expressed a need for a federal project. And our sponsor in this case is Lori Baer, the Executive Port Director for the Port of Palm Beach.

And Lori, if you have any comments, now is your time.

MS. BAER: Good afternoon. Welcome to the Port. It's a privilege for me to be able to welcome you here. And we're pleased that this federal study is now underway.

You know, the safe navigation into the Port is critically important. It's a huge responsibility and we're sincerely interested in this study and hearing your input today and throughout the process.

The Port of Palm Beach, as you all know, is a huge economic engine. Many lives and livelihoods depend on it. Many of our tenants are here today, and you'll hear from them as well. Again, we are pleased that this federal study is now underway, and I thank you all for coming today to be a part of it.

Let me introduce our Port Commissioner, George Mastics, who is here and known to many of you. And I also thank Steve Martino, who is here from Senator Martinez's office. And thank you for being here and thanks to the senator for all his help as well.

Again, welcome to the Port. We look forward to your input.

MR. McMILLEN: Thank you, Lori.

Let me take a moment and introduce the Corps' project delivery team as well as members of the Port's project delivery team, as we are working cooperatively together to reach some solution to address navigational needs out there.

The lady dressed in purple up here, not the lady in red, is our chief of our planning division currently; and that's Marie Burns.

To her right is our navigational technical
lead, he's our senior tech, he's been with the
Corps as long as I have, if not longer, I'm
sure; and that's Dick Powell, upon whom we rely
upon heavily for all of our navigational

experience.

The person to his right is a gentleman by the name of Don Dies. He's with the Port's project delivery team. He will be one of the environmental leads investigating environmental resources within the area and within those designs that we came up with.

We also have in the back at the table back here a lady by the name of Samantha Brucker. She's my study manager for this project.

We have -- down here in the front row we have Amy Kimball Murley, with the Four Gates Company. She is working as a consultant for the Port.

Also working as a consultant for the Port is Nancy Case O'Bourke. And I promised I was going to get her company's name right; and that is Dalton, Almsted and Fugelbee (phonetic}. All right. I got it right. Okay.

And back there in the back, I'll just

bring her to attention, from our South Atlantic division office in Atlanta is Angie Primo. She's down here to partake in this public meeting as well.

Have I forgotten anybody?

Oh, right there in the front and center, one of the more critical people, also our environmental lead from the Corps, he will be instrumental working with Don Dies with the Port environmental lead, and that's Ken Dugger. He will be giving a presentation later along with Don Dies.

Okay. Reviewing the agenda, what we're going to talk about today -- break this into two phases: The first is to provide you with some information, information on the federal study process, as I have reiterated several times already. We're going to brief you on what the NEPA process is, the National Environmental Policy Act process, as that's a process we have to go through to develop the federal project. We're going to talk about those study areas of improvement that you saw in your letters or that graphic that showed some of the areas that we're looking at.

I want you to understand, folks, that we're taking a very broad brush stroke as trying to address what these navigational safety issues are out there. We do not know as yet what it is we're going to be doing. But the last thing we want to do, since it's nothing short of a miracle to go through this federal process, we want to make sure we cover all the bases up front and then start whittling it down to something that's workable. So that's the reason you see the broad brush stroke; all of those alternatives listed on that graphic that you saw.

I will be talking to those alternatives after Ken Dugger does his NEPA process presentation. Then we'll have a presentation from Don Dies on the ecological scoping, some of the resources in those particular areas that we are concerned about, and what he has found to date.

And then what we'll do is I'll close out the first part of our meeting and take a break and we'll set up for Q and A, comments and answers, and we'll do the best we can to answer your questions.

Remember, this is not a debate. We're here to get your comments back. If we do not have an answer to your question, it's not because we can't give it to you, it's because we don't have the information yet. This is a four to five-year process, remember, and this is the first meeting of a series of meetings to be held on this. I'm trying to solicit your comments so we can begin addressing your concerns as we go through the evaluation of the alternatives and coming to a solution here.

All right. After having said all that, let me tell you about the federal study process, which is nothing short of a miracle that we ever get through it. Those of us who have been in the federal government can attest to that. Even those consultants who work for us can attest to that as well.

The federal process starts with somebody, some entity, some taxing district saying we want a federal project. We have a need. We have an issue down here. That entity -- in this case it's the Port -- goes to the congressman and says we need some help. The congressman turns around and passes a resolution. Truly, it takes an act of Congress for us to do anything. Congress authorizes us to begin a study.

Authorization is one thing. We need money to go with it. And that's where the appropriations come in, all right? Appropriations is the money.

We received funds in 2005 to begin a recon study. We took a broad brush stroke of the inlet of the federal navigation project out there and we found that yes, there are some serious concerns that we had to look at. A recon study was approved by our higher authority in 2005. We ran into funding issues in 2006. Therefore, we did not start the feasibility study in '06, we didn't start it in '07. Actually, let me rephrase it. We started it in July of '07 is when we kicked off the feasibility study. And thanks to the Port, they advanced their funds.

The feasibility study's costs are fifty/fifty and we're looking at about a $2 million type study here. So the Port has ponied up roughly three, four hundred thousand dollars for us to initiate and get moving forward. We're waiting for the federal dollars to come down in this next appropriations bill is where we stand right now.

Now, what happens during the feasibility process, feasibility process we begin taking data, collecting data, environmental data. We go out to take sand samples, core borings, all that physical data we need in order to begin the engineering.

We're going to be looking at the sand out there, we're going to be trying to identify where the top of the rock is out there, we're going to be looking at, as Don Dies will say in his presentation -- I don't want to steal his thunder -- we'll be looking at a number of environmental resource studies to be conducted. We'll be looking along the shoreline across the coastal processes to try to address the shoaling issues within the channel, so we have to take surveys of the beaches as well as the channel itself, looking at historical information.

We're going to be pulling all of this together, trying to identify what information we have, what do we need now. And that's what we're going to be doing over the first part of this year; is basically collecting a lot of data because we can't do any engineering without the data.

One of the other things we're going to be doing is running harbor simulation. Ship simulation. Pardon me. Harbor simulation as well, which is running the benefits, finding out what benefits are to deepening, widening to improve navigation.

We're going to be running ship -- taking various sized ships in and out of that Port in a modeling type effort to find out where the currents are, the physical forces on those ships out there currently. What happens if we do this to the inlets, navigation channel, what kind of impacts do these improvements have on that ship? So we're going to be designing it properly. We're going to be running those type of modeling efforts throughout the course of the next two years.

As we go through the engineering, the alternatives that you have seen in that little piece of paper that came out in the scoping meeting that you saw -- and we'll talk to those here in a minute -- we're going to be looking at every one of those alternatives, not only from an economics perspective and environmental perspective but the engineering perspective and also from a funding perspective, okay?

As to when we go through our feasibility process, the federal government, the federal process, we have to look at national economic development benefits. What's the best -- what's the most bang for the buck? That's the federal government process. What can we get the most bang for the buck? We're going to be looking at all those alternatives individually, combining a few to find out what is going to work the best and get the most bang for the buck as we go through that process.

Now, as we go through that feasibility process there's going to be public meetings along the way, okay? As we go through that, we'll probably have the meetings down here or at some venue. And we're going to be doing the same thing as what we're doing today. We're going to be asking for your concerns, posting information out on a website for you to go look at and comment on, and we'll talk to those type ideas here in a moment.

As we get through the feasibility process, at the end of that feasibility we have a document that's been approved, it's been coordinated, most everybody has approved it and likes it, likes the design.

What happens then is it goes up through our review chain up to headquarters for approval and it goes through several independent technical type reviews both inside the Corps as well as outside the Corps.

Once it passes those internal reviews, it goes up to the Assistant Secretary of the Army's office for approval and then basically over to Congress for them to authorize.

Remember, I mentioned authority. Congress -- we do not act on a whim. Congress has to direct us to. Right now all they have done, all the authority they have given us is just the authority to conduct a study. They have not given us approval to construct anything. That approval comes after we have prepared a document, made a recommendation, it's gone through the entire review and approval process and the NEPA process, which

Ken Dugger will explain here in a moment, goes to Congress, then Congress authorizes it.

Congress authorizes federal projects every two years generally speaking, okay? The last authorization Congress made was year 2000, except for recently. They made an authorization, they passed an authorization bill here a couple months ago, 2007. So it's been seven years since Congress passed an authorization bill authorizing a project, authorizing either a study or authorizing to go to construction. The next window of opportunity for us to get this project or these improvements authorized is 2010. That's the date that we're looking for to complete the study, get it reviewed and approved and get Congress to authorize it.

Once Congress authorizes it, they still have to give us the money to go build it. It comes in the form of an appropriations bill, as I mentioned before. The earliest we're going to probably get appropriation funds and move forward with construction, earliest -- like I said, it will be a miracle if we get there -- but we're shooting at a target on the wall that's 2012, okay? So that's the federal process as we go through that on just this study. I can get into the whole intricacies of it, but I'm sure that will invite all kinds of questions and confuse you to no end.

Let me back up a moment and clear up a couple things. The study information -- as we go through the study process we're going to be setting up a website with the study information out there on the web for the people that go look at, for the public to go view and take a look at, okay? On the back here you'll see some web sites for you to look at.

Now, we, the Corps, have not officially got our website for this particular project up and established yet. The Port does have a website that we're putting stuff on currently for people to go view, and I believe your website -- yes, it is Port of Palm Beach. So you can go take a look at that.

Also as we go through this public meeting process, we have a court reporter down here that's taking everybody word-for-word. You're on record. Legal and the whole bit.

At the same time as when we get to the Q and A we're going to be writing your comments on a flip chart and posting them on the wall over there. So before you go, you leave today, make sure you check the flip chart out to see if we captured your concerns correctly because as we go through this process we want to make sure that we've addressed those concerns. In order to address those concerns we want to make sure we've captured those concerns accurately, okay?

Let's see. Basis for the decision for federal project. What makes a project, what approves a project, how is a federal project justified? Comes down to simple benefit versus cost. The benefits are going to be the cargo that runs in and out of the Port. Also the safety issues; the benefits of a cargo coming in and out safely versus the cost. Those alternatives that you saw, those areas we're concerned about and wanting to look into, what's the cost of expanding into those areas singly or in multiple options there to consider. We start comparing those costs versus the benefits we have, and that's where we get to the most bang for the buck; which is going to give us the best benefits to cost ratio?

I think I have covered pretty much the federal process. I'm sure I have confused most of you. It confuses me, and I have been at

this for 18 years, and they continue to change
the rules on me from time to time. But without
further ado on that part, let me have somebody
come up here who's going to confuse you even
further with our NEPA process, okay?
    Ken, do you want to come up and lead us
through the NEPA process?
    MR. DUGGER: Yes. I am going to talk a
little bit about the scoping process and what
is the purpose of the scoping meeting and where
it is in the sequence of events.
    The purpose of the scoping is to determine
the scope of the Environmental Impact
Statement. That is, the issues that are to be
evaluated in detail or not to be evaluated in
detail, alternatives to be evaluated, any
studies needed, the various procedures to
accomplish the Environmental Impact Statement
and other matters relating to the scoping
process I won't get into. They're technical

matters.

The Environmental Impact Statement process can be divided into basically six phases. The process formally kicks off with a Notice of Intent that's published in the Federal Register and also a mailing. This particular Notice of Intent to prepare this draft Environmental Impact Statement was published in the Federal Register on 13 December and was mailed out on 6 December. And in the next step, which is where we are today, is the scoping process, and we're holding a public scoping meeting.

To follow this meeting we would begin preparing a draft Environmental Impact Statement that will accompany the feasibility study, and when it is ready for public release it will be announced in the Federal Register and by mailing and there will be a public meeting on that draft Environmental Impact Statement and feasibility study.

Following that would be the final Environmental Impact Statement and feasibility study. And a record of decision would have to be made by a higher authority before any action is taken on the selected plan, whatever that happens to be.

The purpose of the study and the thing that's being evaluated in the Environmental Impact Statement will be the needs and opportunities associated with Port improvements to accommodate first, future commercial fleet, to more effectively transition the existing fleet, and we will be looking at various alternatives: Widening and deepening, various disposal options, and other alternatives that may become apparent through the process.

We will analyze these alternatives from an engineering perspective. For example, coastal processes, constructability and other issues, economics. That is, what are the economic benefits and what are the economic costs of these proposed alternatives and the environmental impacts of the various alternatives that are being evaluated?

You probably can't see this very well. There's a lot of detail in it. What this shows is the existing channel, and these are some of the limits of the study area. Now, of course, these limits do not mean that's the limits of dredging. That's just the limits of areas that will be studied and considered.

Some of the issues that will undoubtedly be evaluated in detail will deal with protected species, such as manatees and Johnson's sea grass, any wetlands or other water resources, such as other types of sea grasses, hard ground, including perhaps coral species, any mangrove or marsh that might be impacted, water quality impacts, turbidity and nutrients, esthetics, recreation, cultural and historic resources and impacts to those, socioeconomic impacts. And we will also look at ways to mitigate those unavoidable impacts and any other issues that we may identify through the scoping and Environmental Impact Statement process.

Alternatives under the National Environmental Policy Act, we have to consider the no action alternative. We will also look at deepening various depths and widening at various locations, and to various extents disposal options of the dredged material. For example, Peanut Island might be a temporary facility for handling dredge material. Might later be off-loaded to somewhere else; ocean disposal site. There is a designated ocean disposal site for Palm Beach harbor that will probably have to be expanded to accommodate the quantity of material that might come out of the suggested project.

Beach placement. If we have good sand material suitable for beach placement, then we would look at beach placement options and for artificial reef. If we have suitable rock, suitable size and composition, it might be placed on an existing artificial reef or create a new artificial reef.

Other alternatives and measures that might be identified through the scoping process or through the environmental impact process could also come into play.

Studies. There are existing studies: Sea grass survey, natural resources survey and others referenced in the report and in the website, which was referred to earlier. And also we're looking at needed studies. That's also one of the purposes of scoping. Do we need to conduct additional studies?

Mr. Don Dies will speak in more detail about existing and ongoing and proposed studies.

This website is on the back of your agenda. You don't have to write it down right now. We're posting information as it becomes available on this website, and there are other web sites on the back of your agenda.

Procedures. I'll reiterate this real quick. The six steps, Notice of Intent, prepare the Environmental Impact Statement, the scoping meeting, which is where we are here today, the draft Environmental Impact Statement is prepared, then we publish a Notice of Availability and hold a public meeting on the draft Environmental Impact Statement, prepare the final Environmental Impact Statement, do a Notice of Availability of the final Environmental Impact Statement, and prepare a record of decision.

Various agencies will be involved in this process, the Corps of Engineers being the lead federal agency for the Environmental Impact Statement. Other federal agencies would be the Environmental Protection Agency, Fish and Wildlife Service, National Marine Fishery Service.

The Port of Palm Beach is the non-federal cost sharing sponsor. Palm Beach County would be involved, the Florida Department of Environmental Protection and other state agencies and any other roles or agencies that we identify in the scoping process.

As I mentioned earlier, the U.S. Fish and Wildlife Service, a Fish and Wildlife Coordination Act report would have to be prepared by or for the Fish and Wildlife Service concerning this project and any recommended plans.

The Endangered Species Act would involve the Fish and Wildlife Service as well. The National Marine Fisheries Service would also have some Endangered Species Act listed species involved, and they would be involved with the coordination as well. Also the National Marine Fisheries Service, we will provide to them an Essential Fish Habitat Assessment for their review and comments.

The Environmental Protection Agency is responsible for publishing the notice in the Federal Register of the Environmental Impact Statement, and they also have a responsibility to review the adequacy of the Environmental Impact Statement. And there may be other roles or agencies identified.

As I mentioned earlier, the Department of Environmental Protection would issue the water quality certification. They would also be involved in the coastal zone consistency concurrence. The state clearinghouse, which is the clearinghouse for state and regional agencies, would be involved in the coastal zone consistency concurrence as well, and there could be state-owned lands involved. The state historic preservation officer would be involved with respect to any impacts to cultural resources, historic resources.

The Fish and Wildlife Conservation Commission would comment on impacts to fish and wildlife resources. And there could be other state agencies involved as well.

We also involve elected officials, such as the representatives in Congress, the representatives in the Florida legislature, the Town of Palm Beach, Riviera Beach, Palm Beach County, West Palm Beach, Palm Beach Shores and also adjacent property owners, Florida

Power & Light, condo homeowners and various groups, environmental industry or development groups and any other interested or affected parties.

We are developing a mailing list for this action. If you want to be included in the mailing list, you can submit your name and address. In fact, on your registration card you were given that opportunity. Or you could submit the name of some other interested party or stakeholder to be included on the mailing list.

Oral comments. As Rick mentioned earlier, we will be taking oral comments here and they will be transcribed or you may submit your comments in writing and they will become part of the record. There was a comment sheet provided at the registration table if you would like to use that or any other form that you feel appropriate. And also the mailing address was on one of the sheets that you received when you came through the door. The comment -- and the comments card. The comments sheet.

MR. McMILLEN: Thanks, Ken.

Okay. I might add to what Ken had to say with regards to the draft EIS or the final EIS. In the past when we prepared these federal feasibility studies there were two separate segregated type documents. We have the feasibility study and then we have the EIS running separately, and then they'd come together as one document. Now our policy and procedures are to integrate them so it's only one document. So when you grab the document to read, you will see everything comes together as one. You're not having to jump to Environmental Impact Statement to look at things.

What I mean by that is the feasibility studies, they are at least two to three inches thick and there's always a yellow or a green document in there that was an EIS, and the white part or the feasibility study would refer to the yellow part. Now it's all one document so you can read it as you go along. It should be easier to understand, easier to comprehend.

Another part of the agenda today is for me to describe to you the areas that we're looking to evaluate for consideration and address navigational safety issues, the channel widening and the deepening areas. Let's start on the outside and work our way in.

We come up with these alternatives from the Port, from our own engineers, from the harbor pilots. We relied heavily on the pilots since they're the ones that have to navigate the ships in and out. What we found out from the harbor pilots is that area A1, where the ships approach the inlet, they come in from the south because the Gulfstream currents, they use the Gulfstream currents to push them into alignment with the channel. They kind of glide in. Then as soon as they hit the channel, the throat of the channel, they have to goose it and race into, through the throat to the channel. So we're looking at doing this taper on the outside. That's generally deep water. What we see there is just a realignment on paper of what the federal channel is. We'll be investigating those areas. We don't anticipate any serious construction needs, if any at all, in those particular areas.

As we get inside the throat there, we're looking at widening. The ships that are coming in for future vessels are going to be wider.

Also, if we can widen those areas, it provides us a better safety issue for the pilots to navigate those ships in there.

As we get into the area around C, you can see in the pink where the existing federal navigation channel takes a dogleg. It not only takes a dogleg, it gets shallower in that area and narrower. It makes it difficult for the pilots coming in. So we're looking at evaluating area C to give those ships an easier approach into the turning basin as it comes through the inlet.

Area D right there, we're looking at area D because the pilots and some of the traffic coming in there, it gives them a better alignment into those berths directly behind Peanut Island in there and it gives them a safer opportunity to approach those berths.

In area E, it's been brought to our attention that we're looking at possibly expanding the turning basin; basically, doing a little widening of the turning basin in there to give the ships an opportunity to turn better and approach the berths as well.

Area G is the same reason. As the ships

get longer, they get bigger. Right now we're currently having some problems in our turning basin as the ships get longer and bigger and turning around. So you see, we're looking at those areas from purely a navigational and safety issue because it only takes one incident of a ship running aground in this area -- you can only envision what a tanker bringing crude oil or fuel oil for the power plant would do, and it creates -- we've got a big mess.

Those are our concerns that we're trying -- one of our major concerns. We have to improve the navigational safety of those ships coming in and out of this inlet.

So with that -- that's a very short synopsis of those areas and why we're looking into those areas. With that, I'm going to turn it over to Don Dies, who's going to explain to you some of the resource issues we're looking at in those areas and what we have to address.

Thanks.

MR. DIES: This effort represents the first stages of understanding the resources from available information and beginning to plan the future field efforts that need to be done. The purpose of our study is to -- within the potential project expansion area -- is to collect the existing community information and create a GIS database and also a literature database and then to plan and conduct resource surveys to assist in compliance and environmental laws and regulations. We're just now beginning to plan those field surveys.

The location of the project area is within Palm Beach County and North Lake Worth Lagoon, Port of Palm Beach, Lake Worth Inlet and the surrounding communities.

This is the existing federal harbor project. You have already seen that. And the potential expansion zones. Our study will actually go beyond that. 150-foot buffer area around each of the zones also. We will be looking at in-water resources, not going on land, so they'll truncate in the water.

We have already approached federal agencies; Corps of Engineers, National Fishery Service, U.S. Fish and Wildlife Service, state agencies, FDEP, South Florida Water Management District, local agencies. Palm Beach County DERM has been very helpful. And private companies, such as FP&L and NGOs and not-for-profits. Wildlife Trust has given us data also.

First starting within the wideners area, A1 and A2 in the offshore environment, I'm going to go through some of the information we have collected in our GIS database.

This is 2003 Laser Airborne Department sounding data. What this does, this is provided by FDEP. It provides depth and the ability to simulate contours and relief in the offshore environment. And this combined with, just off the press, it is the reef mapping done by Nova Southeastern for the Southeastern Florida Coral Reef Initiative. This is reef mapping, and these different features, this is all sand here, this is the offshore reef, the natural offshore reef, this is an artificial reef signature right here, these are the rock piles. This is former material that was taken out of the channel during the original dredging of the channel, deposited here, boulders in this area, and it is an artificial reef type of environment. There's a little signature up here. I think it's just an artifact. This data was field verified to some extent, but not too well in this area, so I think that's just an artifact.

If we combine these two layers together into depth contours and also the self-created data, you can see most of the depths in the reef environment are deeper. They're in the order of 50 feet or greater, 55 feet or greater. And the rock pile is also deeper. In the area of 55 feet. Some of the sand areas are shallow. Thirty-five feet in the southern widener.

Now, moving into the inlet throat proper, these are our survey areas and potential expansion. They're mainly shelf areas, and also the inlet walls themselves. There haven't been any real studies done in this area. We do have the 2003 Laser Airborne Department sounding data that does penetrate. It was intended to be an offshore study, but it did penetrate into the inlet, and it provides us a depth contouring where you can see the inlet walls themselves in the shelf area behind it and the riprap of the inlet. Same on the south side.

Just initial surveys have shown this is a definite rock area here that was cut. These are cut through rock area also, north and south.

Into Area C, this area is mostly a hard

bottom area between the marker 8 and the range finder here.

We do have several survey studies that have been done in the past. This is a 2001 sea grass mapping done by Palm Beach County DERM. It does have field verification associated with it. And you can see some sea grass areas coming into this southern area around Peanut Island.

We also have a 1992 statewide sea grass survey done by Florida Marine Research Institute. This was less field verification, mostly done by aerial imagery interpretation. You can see a continuous sea grass area coming into the soft bottom area behind the range finder.

We also have a 1990 Palm Beach County Submerged Natural Resource study. This wasn't done by NGIS, and so what we've had to do here is kind of stretch the information to fit the

GRRIS format. But you can still see features
on here. You can see the hard bottom area over
here, and you can see this shows up as a hard
bottom feature here, and that same sea grass
area just continues a sea grass area coming in

right there.

Area D behind marker 12 here, south of Peanut Island, again our survey area will be truncated at land's edge and be concerned with water resources.

We do have the 2001 sea grass data from Palm Beach County DERM, and it shows a continuous sea grass bed in that area and some discontinuous sea grass. That will be mainly be the halophilous species.

1992 shows discontinuous sea grass area beds in that area, and the same is true of the 1990 submerged bottom studies.

In this area is Johnson's's sea grass and Halodule shoal grass.

Area E is actually the northern extension of the Intracoastal waterway, and this is the 2001 sea grass data and also the 1992 combined because there wasn't really anything that really entered the study area at all with those. And then the same is true really with the 1990 submerged aquatic resource data.

Area F is south of the Port channel and south of the basin area. The 2001 data, I'd like to point out here, this is actually the

FP&L heated water discharge point right here. They moved it out into Lake Worth Lagoon several years ago and you can see copious and discontinuous sea grass beds in this area.

This is the 1992 Florida Marine Resources Institute data. Discontinuous sea grass beds throughout this area.

And the 1990 data. This pretty much indicates to me a cover of -- summertime cover of halophila decipiens, paddle grass.

This is Area G along with its buffer area. You'll see a signature right here of an algal mat. This is 2007 aerial imagery, by the way, from wintertime 2007. You can see 2001 sea grass imagery sort of follows that.

This is sand down in this area. Follows that pattern with continuous and discontinuous sea grass beds.

The 1992 statewide FMRI data is pretty much discontinuous sea grass beds throughout that area, and the same is true of the 1990 submerged aquatic resources.

More detailed information about sea grasses just from the literature itself, Lake Worth Lagoon sea grass species dominant are shoal grass, halophlia wrightii, paddle grass, halophlia decipiens and Johnson's sea grass, which is a listed threatened species. Infrequent species are turtle grass, manatee grass and star grass, another halophlia species. These are found mainly in the northern part of the lagoon north of Blue Heron Boulevard.

Lake Worth Lagoon sea grass coverage, these are the 1941 interpretation of aerial imagery available at that time. You can see a very low point in the lagoon sea grasses in 1975 because of poor management of the lagoon waters, allowing surface water runoff and sewage treatment plant outfalls into the lagoon area.

A clean-up of that and a resurgence of sea grasses in the 1990s back up to about 50 percent of the level. The difference between the 2001 and 1990 is not really significant, the differences between there. This could be mapping error. So about two thousand acres, about 50 percent of what was estimated to be in the 1940s.

Most of your sea grasses -- this indicates most of your sea grasses are in the northern part of the lagoon, and most of your sea grasses are found in six feet of water or less.

This is the 2001 Palm Beach County sea grass mapping effort within the lagoon area, just to give you an overview of that.

Sea grass surveys were conducted in 1975, 1990 and 2001. Since 2000 Palm Beach County has been conducting annual monitoring of nine transects located throughout the lagoon. There's been little change in those surveys except after 2005, and that was really due to the strong 2004/2005 hurricane season with two significant hurricanes in 2004, Jean and Francis, and then also Katrina and Wilma adding a lot of water to the area in 2005.

Moving now to manatee aerial data, this is 2007 surveys done in February; two different dates in February. You can see here between 150 and 300 manatee, and mostly in the area of the FP&L discharge along the shoreline, and then manatees also in that area around that area in the sea grass beds, resting and feeding. And this really uses that 2007 aerial which was done in February of 2007 to show you the manatees near the discharge point and then up in some of the algal, macro-algal beds and sea grass beds along the shoreline.

Our basic conclusions are that background information indicates that there are habitat concerns within all potential expanse areas. There's some inconsistencies in the background data. This could be due to the year-to-year changes, major storms, things like that.

We'll begin our actual field certification and validation of resources in 2008 beginning soon in this year. Our surveys will be towing video within the ship channel and the deeper expanse areas at the berths and the ship channel, then in A1 and A2 with some diver spot checking of that data. And then within the shallower areas within sea grass growing season, April to September, we'll be doing surveys in B1 through G and those areas of potential sea grass throats.

Thanks.

MR. McMILLEN: Okay. That concludes our technical presentation at this time. I'd like to take a moment before we take a break and move into the question and answers to recognize

Counselwoman Lynn Hubbard, who is here.

At this time we're going to take a short break and we're going to set up a panel, the folks up here. And the Port has been very gracious to set up some food and beverages for you during this break. What we're going to do is take about a 15-minute break, no more, because we don't want to be here any longer than you guys have to, and then we're going to come back and conduct a question and answer session.

Correct me if I'm wrong, Marie. If they want to go on record to express a concern or ask a question or whatever, please fill in a card so we can get your name and address so we've got a record of that, please. You can do that during the break. So let's take about 15 minutes. Time now is 4:00. How about 4:15? And we'll start it back up then. Thanks, folks.

(Thereupon, a short recess was taken.)

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MS. BURNS: We have to get started on the comments and we do have a short number. I just wanted to reiterate again the Corps of

Engineers is dedicated to making this as transparent a process as possible, so as we go along and we are posting information, et cetera, if you feel that it's not happening, I would very much appreciate it if you would let myself or any of the staff know that. And what can we do to make it more transparent? So again, we're dedicated to doing that, so please, please let us know if you have any suggestions for us.

Okay. I'm just going to go through these and call folks. There's a podium. That way we can make sure we hear everything you have to say. And I was just going to call Miss Markin first.

SPEAKER: Well, I didn't really want to be first, but that's okay.

MS. BURNS: Oh, okay.

SPEAKER: Susan Markin. I live in Palm Beach at 1450 North Lake Way, which is directly across from this Port, and I can tell you I bought the house because I love the Port, I love watching the activity of the Port, and I love this particular environment right here. I'm just very concerned about the expanse of the Port. And I will also say I'm on Town Council in Palm Beach but I'm speaking as a resident and as a concerned neighbor, as I mentioned earlier the proximity of my house to the Port.

I can tell you that from the plans that you have shown here as far as your potential expanse that the microscope or telescope that I currently have to watch the activity I won't need as much because the boughs of the boat should be coming much closer to my dock.

My concern is this: As much as I can appreciate the economic viability that you speak of relative to the Port and the potential economic growth that you'd like to see at the Port as well as your navigational safety concerns that you're expressing, I would suggest to you that maybe your safety issues are self-imposed by bringing in larger ships than what the Port can physically handle, which

is why you're looking to expand it. And I
would suggest also that the image that comes to
mind is that you're trying to fit a square peg
in a round hole. Or even worse than that, an
elephant into a bread box.

The size and the growth of the Port is a concern not only with all the other issues that you bought up as far as species and the recreation areas as well as the other environmental issues, not to mention all the other things that you're going to study, engineering, shipping, doing ship simulations, economics and environmental, but the bigger picture that I'm here to speak of today just on the first glance at this is this area is surrounded by small communities.

You look at Palm Beach Shores, you look at the Island of Palm Beach and Riviera Beach. This is not Miami, it's not a Miami Beach, it's not a Ft. Lauderdale, and I have a very grave concern, and I think it's shared by other residents and other municipalities, that you're trying to enlarge a port in an area where people look at this as a small environment. And the Port certainly has been here and we have agreed to certain things that have taken place in the Port in the past with the idea that it was within a feasible entity for the surrounding areas.

When I look out my window what I see are people in kayaks, individuals in kayaks. As of late, you have individuals on surf boards with the long paddles. You have smaller sailboats that are mooring in the lagoon, an area according to your map that will go away. You have small boats going around recreationally. This area is for the residents of this area, the tourists of this area, which is also a very good economic business for this community and for this area, so I'm very concerned that you're trying to do something here that is not befitting of the municipalities in this area or for the surrounding neighborhood and for the surrounding neighbors. And as much as I like the Port and the activity of the Port, I think we should be cautious about the growth capacities that you are looking for and what it is going to do to the other economically viable industries we have, such as tourism and premier community on both sides of the inlet coming over here.

The other thing in terms of -- you wanted specific issues in light of your comments that you want to be transparent, so I'm kind of hitting you with some very transparent concerns. I do have some concerns about the protected species; the manatees. I have concerns about the esthetics and the recreation areas that I mentioned before.

One other area that has been brought up, and I would hope that someone's going to study it in a much more technical way than I'm capable of looking at it, but what does this do for increased surge potential during storms by widening and deepening this particular area?

And last but not least, and probably foremost, is what does this do to sand retention south of the inlet, which we're already suffering from in the Town of Palm Beach all the way down to the next inlet down?

So those are my concerns and I hope that you take the time to address all of them.

Thank you.

MS. BURNS: Thank you.

Okay. Mr. Elwell?

SPEAKER: Good afternoon. My name is Peter Elwell. I'm the town manager in Palm Beach. And I'm going to cover a couple of the same things that Counselwoman Markin did and a few others on behalf of her colleagues and herself on the full Town Council and Mayor McDonald for the Town of Palm Beach.

We're concerned about the size and number of ships that would be coming in after the widening and deepening activities occur and would like to make sure that the study is very clear as to what the goal is in that regard, what this work would be intended to accomplish in terms of creating a greater volume of shipping activity and what size vessels would be intended to be accommodated so that the impact of more shipping traffic and larger vessels can be accurately identified.

One of the concerns in that regard is safety; both the safety of the recreational vessels, since there's so much recreational activity going on with small boats in this area, safety for them; safety also for the Peanut Island area, the park that's been developed by Palm Beach County and the activity that goes on in that area.

We noticed in some of the diagrams during the presentation that particularly in Area C and E it would be creating the opportunity for shipping activity to come much closer to those recreational areas. I'm sure Palm Beach County would have something to say. But that's a concern the town would like to see addressed.

And the water quality issue, particularly if the size of vessels, the increased size of vessels that would be able to come in, might also mean a different type of vessel coming in and calling at the Port.

Then we'd like very specific information in the study what type of vessels will be attempted to be accommodated and what additional risk those type of vessels might pose for water quality and other safety concerns.

Counselwoman Markin did mention about the flow in the inlet, and that's something that we do recognize is beyond all of our expertise in coming here to represent the town today, but we have a very great concern, and we know you'll have experts addressing that issue.

We really need to be satisfied that the
change in the dynamics of how the twice-a-day
tidal activity will occur as well as storm
surge when severe weather arrives.

We know from experience from past decades after previous improvements at the inlet that there were some changes that have caused erosion on the shoreline in the inlet and on the lake side and also concerns about the potential it may have exacerbated the storm surge and flooding from the lake side during storm events, and we'd like to see technical information presented in this study that would address those concerns.

We were happy to see that in the notice that came out there's an intent not to do blasting and an expectation that blasting may not be necessary in order to achieve deepening and widening. We would be especially concerned if blasting is going to be required so we ask simply as you go through the study if at some point blasting becomes a possibility or something that's going to be entertained as a method of proceeding with this project, that that would be not only studied in detail but those of us who have signed on as being interested parties be immediately notified that that has become a consideration. Right now the way the public notice was presented, that was sort of a reducing the fears and doesn't look like blasting is going to be necessary so we just ask if it becomes part of the study, you let us know right away so that we can then engage more specifically on that issue and see what expertise you're bringing into the study in order to address the impacts blasting might have.

Finally, because of the possibility of the widening and deepening exacerbating the erosion problems that already exist, there are numerous activities going on around the inlet right now, some of which we have been very directly involved between the council and the county and the Port in addressing other areas of inlet management so we know that there's an effort to make sure that we don't do anything in all of this to create further down-drift erosion, but we would ask that you in the study specifically address that and make sure assurances can be made that none of this activity is going to

further the historical erosion that has
occurred south of the inlet as a result of the
inlet existing and that whatever beach quality
sand may come from the work that's to be done
in this project, one hundred percent of that

beach quality sand needs to go onto the beaches south of the inlet. We can't afford any additional loss. We had years of that material going out to sea.

We have now, between the federal government and local entities, worked out a nice arrangement where the inlet is dredged, the material is going on the island to the south, so we're addressing together that historical erosion. We want to make sure nothing out of this project would create any new erosion or loss of beach quality sand, so we ask that under any circumstances beach quality sand that's identified through the surveying that you're going to be handled, that every grain of that beach quality sand go in on the beach in the Town of Palm Beach.

Thank you.

MS. BURNS: Mr. Russo? I'm going to apologize now if I mess up your names.

SPEAKER: It's David Rosso. I happen to live next to Susan Markin on North Lake Way. I'm a resident of Palm Beach and I have lived on the water and been on the water most of my life. I have owned all sizes and shapes of boats. I was in the Navy, ran a couple of large vessels there. I have a very close friend who's heavily engaged in the shipping industry, and I can tell you that I'm very much opposed to any growing of the Port of Palm Beach.

As I watch it every day, and I enjoy watching it, it's fun to see the ships come in, it's great when I see the pilots go out, coming in, I know something's going to happen when I see tugs moving around, I have an idea something's going to happen, and I watch that and that's a lot of fun, and I understand some of the navigational issues that pilots might have, but I have also seen them during inclement weather using tugs to get ships in, and it seems to me if you need a tug to help guide a ship into the Port, use one.

I hail from Connecticut and we have two very deep water ports; Bridgeport, Connecticut and New London, Connecticut. The state of Connecticut has spent untold millions of dollars to make those ports friendly for shipping. I think in New London Connecticut the state spent over $35 million to get the New

London docks rehabilitated and to get that port in action. For the last five or ten years all they do is get a couple ships in who bring in lumber and they store the lumber on the docks. They employ one and a half people. So it's not a great return on the investment.

Here, 99 percent of vessels I believe go to the islands. So to assume that a 600 or 900-foot vessel is going to go to the islands is ludicrous because they can't handle them. Most of the vessels that I see coming in here are much less than 300 feet. They're very small container ships, bulk carriers. And to think that we're going to get 600-foot vessels in here when everybody is going bigger, according to my friends, is silly. We're not going to get ships from China, we're not going to get oil tankers from the Middle East coming in here. I don't think any of us want that. So I think you're trying to look at this the wrong way.

If you have navigational issues and you said, somebody said, the depth is 29 feet and it's authorized to be 33 feet, make it 33 feet. That's all. If you need more help getting a ship in here, use a tug. That's what they are here for. And they are used quite frequently. I appreciate the pilots having their concerns, but the pilots were -- I believe most of them are former tug captains. They know what it's like to have a tug. So I think the whole plan is overreaching.

Like Susan, I think if you have one of these large ships in here, I'm going to see his bough against my boat, and that's not going to be a lot of fun.

I don't know what's going to happen to storm surge. I know -- I have friends who live on the north end of the island who are very concerned about what's going to happen to their properties if you dredge any closer to their property. They have seawall issues already. We don't need any additional seawall issues. So I think you should look at this as a re-dredging of the inlet project and basically forget the rest. It's not needed. You're going to impact the environment here of people more than you're going to improve it for shipping and commerce.

There are a lot of people that use this

water for recreation. That's why they came here. They're the driving force in Florida. They should be taken care of.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Royal Victor?

SPEAKER: Yes. Good afternoon. My name is Royal Victor and I'm a resident of Palm Beach. I share much of what the speakers before me have said, and I have two questions. I will confess that they're rhetorical.

Question Number One: Who wants this expanded Port capability? We're essentially a residential -- this area of Florida consists essentially of residential communities and I don't know, we taxpayers and people who make their homes here, I honestly don't know who wants this expanded facility.

Secondly -- and this is not a rhetorical question so much as seeking guidance -- is it true that the Corps of Engineers is the overarching CEO of this project? In other words, will you be gathering information from a whole host of different interested parties and then assemble that information and make a determination as to the relative merits of the arguments or, indeed, will the process permit all of us concerned citizens to talk at the federal level, which is you, presumably at the state level, which is Tallahassee, at the county level, at presumably the port level, Port Authority level and others? In other words, who's in charge? Who does one go directly to to either express concerns or make a particular plea on behalf of certain interested parties?

MS. BURNS: Thank you for your comments.

Part of what you're doing today is giving the information to us as we go through the federal process, but we certainly do consider the Port one of our partners. They're also the non-fed sponsor. But your comments today will help us flesh out some of the issues that we need to look at from a federal standpoint.

Mr. John Turner.

SPEAKER: Hello. My name is John Turner. I'm an attorney in West Palm Beach. I represent -- I'm here on behalf of Teeter's Agency and Steve Doring (phonetic), a Port tenant and user.

In answer to the gentleman's question who just spoke, my client wants this, and I don't think I would be speaking out of turn to say that everyone who does business here at the Port probably wants this.

The connection between the Port's -- this Port's capacity and the overall economic viability and fluidity of this region is immediate and direct, and I hope that that's observed.

I have used this analogy before and I'll use it again. If every year Mother Nature decided to chew up and overgrow ten to twenty feet off of the end of every runway at the West Palm Beach airport, within a couple years probably everyone within Palm Beach County, probably residents in adjoining counties, would be up in arms about how that would be allowed to continue even though perhaps the residents in the adjoining areas might not mind that large planes could no longer begin to take off or land at that airport. And the same is true for this Port.

As Mother Nature essentially tries to do what she's doing at this inlet, there are very real and immediate effects being felt by my client and every other Port user. And that's before you even consider the direction that the shipping industry has taken with expanding the size of ships.

One significant comment that I want to emphasize is that although the phrase "Port expanse" has been thrown about a lot, for those who have actually done business at this Port for a long time this is just as much about Port restoration or inlet restoration as anything else. Again, Mother Nature is trying to fill something in and probably always will try to fill in this inlet, and my client is losing business because it cannot accept ships and the cargo that those ships bring on them regardless of tug boats and frequently because pilots will refuse to accept business.

Now, it would be shortsighted to react to that and say well, one business losing

business, so what? I respectfully suggest the
answer is that we are losing business and it's
the cost of our consumer goods that's going up,
it's the cost of our steel, our rice, our
watermelons, our cars that is being impacted

here.

Anybody who remembers the supply and transportation bottlenecks caused by hurricanes Francis and Jean remember the immediate impact that that type of bottleneck will have on commerce. And that's exactly what's happening, although it's subtle and it's perhaps easy to overlook because to the public in general it's not immediately felt. Well, I'm here to tell you on behalf of Teeter's Agency, which is a family business that makes its living from moving cargo on and off ships and moving that cargo further inland to support construction, commodities, every other type of business that you can imagine, that that bottleneck is having a significant effect. And although the Corps may be looking at this as an expanse project, it is just as much about restoration. That's not to say that Teeter's does not echo many of the environmental concerns.

My client hopes that the Corps will take a methodic approach, find ways to create win/win solutions. We're encouraged to see beach restoration and artificial reef outcomes of this. There's no reason why business and environmental concerns have to be mutually exclusive; however, environmental concerns should not be a pretext behind which local interests, immediate interests and private interests use to essentially try to prevent this area from growing economically.

Thank you.

MS. BURNS: Thank you for your comment.

I'm looking for the name. Mr. Vogel? For Synergy Resources.

SPEAKER: How are you? My name is Rich Vogel. I work for Synergy Services. We just recently built an asphalt plant in West Palm Beach and most recently opened up a diesel plant in West Palm Beach and we are for the dredging. We don't see it as an expanse as much as a maintenance and safety operation.

I have worked at a lot of ports in my previous life in the petroleum industry. I have worked in several of them. I like the setup that's in this port. It's very small and nice and contrite. It's not as crazy as all the other ports that I have already worked in. But I do see a good viability and a good possibility of a good, solid, sound business in this port that does get held back a little bit because of the dredging issues.

Some of the vessels cannot come in because they're too large, so it means we have to come with more frequent vessels, more than we would if it was one big one versus two or three smaller one. A larger vessel with better dredging will sometimes minimize the number of ship trips that come in versus create more, but it gives you better flexibility for the type of vessels that do come in. It also influences some of the costs that's put into what it costs to get in.

There were several times we were trying to bring in asphalt and we couldn't bring it in. We actually had a vessel on its way and it was deemed it couldn't make it, too close, and the pilot said no, you can't bring it in. So that had to get turned and sent someplace else. So it is a problem with doing business with the dredging that's ongoing.

Also the safety is a very important cog in the shipping business. Everything needs to be safe. There can't be incidents, there can't be accidents. If dredging minimizes or takes that away, then we're all for it because we want to move things safely.

Recently I was down in Brazil with the Governors Commission, I was down there with Lori, and there's a lot of interest in this port because they see how congested Port Everglades is, Miami is, they see the possibility of something being done here, but there are restraints because of the dredging and those issues. So we are for the safe, environmental, ecological dredging if it can be done. I mean, we think it works. So we're one of the people who are for the dredging operation.

Again, this is a long process. You have a lot of people. I've been involved in Port Everglades' dredging program down there, their massive port plan, and there's a long way to go here. But you have the ability to work together in a finite area to make this work.

So we are for the dredging and we are for the
environmental impacts and economic impacts that
they could provide.

MS. BURNS: Thank you for your comment.

Mr. Dick Breezy, Breezer?

SPEAKER: Hi, folks. I'm Dick Bresse and I live down south of here in West Palm Beach.

MS. BURNS: Could you get a little closer to the mic, Dick?

SPEAKER: Better?

When I read the story in the paper about this, the first thing that came to my mind is another disaster. And it will be a disaster. And you don't need a two million dollar study to figure that out.

What's proposed? Widen the inlet, deepen the inlet, and enlarge the settlement basin. Will effect will it have? It will allow more water and more energy to enter the Intracoastal and it will steepen the grade, which will cause erosion.

We should look at a few things that we learned in Engineering 101. First, the effect of gravity increases as the grade increases. You have so much gravity here, you increase a grade, you have more gravity. More effective gravity. And that will give anything on the surface a bigger propensity to slide down that surface. You have a hole this deep; here's land, here's the bottom of the hole. You drop that -- this is your grade -- you drop that hole five feet, you increase the grade, you're going to get more stuff rolling down that grade.

How will this affect Singer Island? It will reduce the grade along the beach more than it is now, which will give added energy to moving the sand down, and so you will have more sand being moved down off the beach on Singer Island than you have today.

Now, today you may have some sand move south and stop. If you get southeast waves, that will push it back up, and so the residents' time on the beach will be longer. If it goes all the way into the pits, it is going to be gone.

They're already talking about a $30 million breakwater on Singer Island. This would exacerbate their problems.

In Palm Beach island any material that

presently moves over shoals will never make it.
It will drop down into the deep hole.

Secondly, we should look at the formula that the amount of current, the amount of material that a current can carry, varies directly as its velocity squared. If you double the velocity of the current, it can carry four times as much material. If you cut the current in half, it can carry one-fourth as much. So if you have an increase in current and material that can be fluidized, enough energy to fluidize it, you're going to get erosion. Period. End of story. It is going to happen. And if you have a loaded-up current that drops in velocity, you're going to get it dumping part of its load and you're going to get erosion. Again, period. End of story. That's the way it works.

West Palm Beach is having problems with their retaining walls, and the gentleman said that we're having some problems in Palm Beach with them. Now, as this water, extra water, moves in, it is going to be neck down and it will accelerate. And if you have enough energy there and material that can be fluidized, which it appears there is because they are having problems, you're going to have more problems with your retaining walls than you're having today. It's gonna happen.

Then the third thing is that you have

increased mass that takes more energy to move it. So if you have bigger ships, you're going to have a bigger wake, you're going to have more energy from prop wash, and when that hits the shore, it's going to fluidize the material there and the grade is going to be steeper. So you fluidize it, gravity is going to do the rest. It is going to carry it down into the bottom.

I think an alternative to this is to have continuous dredging. When I was walking the beach there were two areas that were doing it, and I can't remember, but Dr. Kuvin has at least one of the areas. I can't remember it. But if you had continuous dredging, it would take care of this three-foot fluctuation in sand on the bottom in most cases. And if you have a good, clean bottom there, if you have an event with a bunch of sand moving in, it's not going to be as bad.

Like I said, if this project is done, it's going to be a disaster.

Now, we're talking about the income the Port can generate. We should compare that to the income that the beaches generate and see how much money the beaches generate compared to what the Port does. The politicians are going to have to make up their mind whether Palm Beach County is going to be an industrial county or if it's going to be a good place to live and a good place to welcome tourists. But if this goes through, it's going to be a disaster.

Thank you.

MS. BURNS: Thank you for your comment.

Dr. Kuvin.

SPEAKER: Thank you, Miss Burns.

My name is Sanford Kuvin, and my wife and I are 44-year residents of the Town of Palm Beach, and our property is located at the northeast extremity of the town, directly in the shadow of the inlet. We live at 149 East Inlet Drive.

Our substantial interest, just like the other 8,000 residents of the Town of Palm

Beach, will be absolutely and directly affected if the Army Corps adopts this project of inlet expanse.

Miss Burns, you stated in your letter of December 6, 2007 that the Army Corps is gathering information to define issues and concerns associated with the expansion. Mr. McMillan has indicated that this is a navigational safety issue. It's a commercial issue, it's not a navigational safety issue.

And please let me help you define our concerns both personally as a family and speaking for many residents of the Town of Palm Beach. We've lived here for over four decades and we believe that this expanse should absolutely not take place for the following reasons: Over four decades ago -- you indicated that transparency is one of the hallmarks of your current inquiry, and four decades ago the Army Corps was here at that time, only at that time they blasted, they dredged, and yet we have heard nothing about that historical aspect as it impacted on the Town of Palm Beach and the surrounding communities, where damages were afforded and where inquiries were made. Transparency indicates the past, the present and the future in terms of how it impacts on the residents, and that has not been accomplished in your meeting today nor has been the history of the inlet, which is absolutely germane to why we're here today.

As you know -- I won't go into the details, but it was built in 1928 and '29, it was deepened, then a few other times in the interim deepened. In 1958 the sand transfer plant was created not out of charity to Palm Beach but because of the harmful effects that the inlet -- even the federal government agreed through the Federal Harbors and Rivers Act -- and mitigated creating that sand transfer plant. But we're not here to discuss the plant, we're here to discuss the impact of further expanse, which has been ongoing since 1928 and 1929 through the '50s.

And by the way, there's documentation about the impact on residents who are still here who were awarded damages at that time.

Miss Burns, you cited significant environmental issues in your letter that went out on December 6th and that were related to what Mr. Dies explained today; a number of endangered species, sea mammals, migratory birds, water quality, but nothing in your letter mentioned the impact of the expanse on the human species. Everything was relegated to other species, and yet we're here today because of the impact on us; the human species.

In 2005 a paradigm at that time occurred -- which you may be acquainted with, maybe not -- namely, that a company called El Paso Gas initiated the Seafarer Project, which was near to installing a two-foot pressurized gas pipeline coursing through the Lake Worth Inlet. Fortunately, proactive debate took place by a handful of citizens, just like you're hearing comments today, about that particular issue of a gas pipeline being put in the inlet going to Florida Power and Light. That was defeated and they moved elsewhere. Why? Because the port was too small. Florida Power and Light realized that other areas, including Port Everglades in Miami, were more receptive to this natural increase in the necessity for pressurized gas coming to our

region. And that was a paradigm of how
commerce failed to local interests, and I would
urge you that this is a similar paradigm.

We're still recovering from four
hurricanes in Florida, as you know, and they

all paled in comparison to the Asian tsunami, but it caused huge environmental damage to our reef system along the property and coastal damage. The residents of this community should not -- and it's the residents, not the commercial interests, but the residents -- should not allow yet another disaster from this expanse, which will surely bring it, as Mr. Breese just articulated.

There are serious objections coming from a hit list within the airport expanse which include noise pollution, air pollution, the outcome of increased shipping vibrations, garbage in bilge dumping pollution, and even -- you may not be aware of it, but the red mite pollution, which was mentioned in the December 29th issue of the Palm Beach Daily News, a mite coming into our shores which is infesting all of the palm trees. It's obvious that with deepened and widened channels, as you

have heard today, so obvious, there will be an
increase to the threat of flooding,
particularly in the Lake Worth Intracoastal
waterway, which began over four decades ago.
The increased velocity of water, as you

have heard before, will be rushing through the inlet and will cause even greater Intracoastal and beach erosion.

We're consumed in the sand wars today with erosion not only in Palm Beach, not only in Florida, the world over. Beach erosion has entered into a warfare state because of events we know about like global warming, rising tides, putting more concrete on our shores, hurricanes and other things we don't know about; but nevertheless, it's here and it's not going away.

It's been indicated that there will be bigger and better and larger and deeper draft ships coming through this inlet. I have heard figures going anywhere between six and nine hundred feet with sparse room to even turn in the basin.

In addition, on an average day -- we live right at the inlet, we have lived there for over four decades -- you know, what with increasing threats to our homeland, we see on any given day Homeland Security boats, helicopters, the Sheriff's boats, Palm Beach police boats, West Palm Beach police boats, Customs boats, the Coast Guard, and please accept on faith that all of them have appeared on any given day. It's a traffic jam unto itself. It's hard to imagine what an increased traffic that you're proposing if this were to go through with the deepened port widening will bring, and particularly, particularly with the ongoing threat of terrorism that we are faced with today as a nation. That aspect is not going to go away, it is going to only increase, and we don't want to be a participant to its increase within the confines of this, what used to be a sleepy area which was always a charming area but unfortunately is becoming a slick area.

You stated in your letter that one of the alternatives to be considered is no action. The vast majority of residents who live in this area and who will be impacted by this expanse urge you to carry back the message to

Jacksonville and to Washington to do just that; take no action. And in doing so, you'll save the taxpayers millions upon millions of tax-payer dollars.

The Corps prides itself on cost

efficiency, and if I ever heard a story in the making for cost efficiency, this is it. The Corps has come under enormous pressure, as you well know, in recent times. It was mentioned in an editorial in the New York Times in November, it's had congressional impact studies on it. This is no secret. And it's no secret because of the Corp, to quote a phrase from the New York Times, which sought reforms to impose discipline on a notoriously dysfunctional agency. Those are the quotes of the New York Times. Diane Feinstein and other senators have voiced this concern about Corps action.

And does the Corps do wonderful things? Absolutely. You have now in your hands, I believe, 22 billion in the Water Resources Act, and I believe some of this money will come from that, but I think all of you will agree that it must be spent with a conscience and where the good -- where the reward will outdo the risk.

The real question -- and let me also add parenthetically we have seen some wonderful things happen with the Corps in our region. They have kept our inlet at 234 feet, they have given us free sand on the shores of Palm Beach, which that's multiple millions of dollars at about $10 to $13 a cubic yard, and they have benefited the Town of Palm Beach in many, many ways. However, that was done to expedite the commercial interest of the Port of Palm Beach, it wasn't done out of charity to the Town of Palm Beach. We were the beneficiaries of that, quote, free sand and we look forward to more of it coming because it was the Corps and the federal government that caused our problems in the first place, going back historically.

The real question the Corps has to answer is, is the risk of this extremely controversial and environmentally dangerous project with untold unpredictable associated hazards worth the commercial reward? I think not. The vast majority of the residents of this area think not. And I hope the Corps will take no action as its alternative.

Thank you very much.

MS. BURNS: Thank you. Thank you for your comments.

Terry Gibson Gibraltar.

SPEAKER: It's not explicitly clear to me. I understand there's options from zero, do nothing, to very aggressive options, and from the presentation it wasn't clear to me what the most aggressive option is regarding what you would do from the inlet mouth seaward. Are these jetty extensions or the edges of dredging? Can you answer that question?

MR. McMILLEN: It's already deep water out there. If anything, it would be just a line on a piece of paper. That's all it is.

SPEAKER: Okay. I'm Terry Gibson. I'm the projects editor for Sportsman's Magazine. I grew up here. My family's been here a hundred years. I know these waters and the natural resources here intimately. And I certainly appreciate the Port is an economic engine, but you're not the only economic engine. The engine that I represent, salt water recreational fishing in Florida, is worth about $15 billion a year. Salt and fresh, it's massive in this area. The value of coral reefs in Palm Beach County are worth hundreds of millions of dollars. The diving and surfing communities are also massive economic engines in this area. Whatever is contemplated here, I encourage the Port to proceed thoroughly and cautiously and slowly with lots of stake-holders' involvement.

One concern I have inside the lagoon is on the sea grasses. Before contemplating dredging some of those up, we have to realize not all sea grass beds are created equal. The location of these sea grass beds is very important.

Grant Gilmore has oodles of data from the Indian River Lagoon and I think probably from the Lake Worth Lagoon showing sea grass beds close to the inlets are more valuable for fish; furthermore, they're more valuable for reefs. Our reefs are in a lot of problem. Over-population is one of the gravest concerns. So whatever is contemplated, you need to consider the value of those reefs or the sea grass beds near the inlet where the Gulfstream's coming right to the beach and bringing from the Keys and Caribbean -- things are settling out there, and they have a very short ontogenetic highway with manmade reefs right in the lagoon, shallow reefs right outside the inlet, and lines of reef on out to that.

There's a number of studies, Mumby (phonetic), et al, a few others, that show the shorter the fish has to migrate throughout its life history in a different kind of habitat as a baby, as a teenager, as an adult, the greater the survival is. Of course, that's confounded by fishing pressure, but that's another story.

Judging from your assessment -- and I understand this is very preliminary -- of the sea grass resources in the area, they seemed a little understated. I spent a lot of time with an underwater videocamera in this area filming for various TV shows, and the sea grass beds to the south of D and around F and G seem -- I was there in November -- they are very robust. Yeah, there's some sand patches in between them, but they also occur at depths I have never seen. I have seen Johnson's's in almost 30 feet of water, which is highly unusual, and it has to do with the incredible quality of water thanks to the Gulfstream. So I hope you all will take a look at sea grasses.

You said something about 150 feet of where you might dig. Dredging, especially if there's carbonated muds in the area, dredging this might cause turbidity issues, could kill those sea grasses or create a light starvation condition that can create -- that could kill those sea grasses if persistent turbidity occurs there, or imposed starvation.

Also in the sea grass the Corps along with the Port, some of the best work I have seen you guys do, I always -- you know, my story is, as a Florida sportsman, is mostly pathos and loss, but the Lake Worth Lagoon is one of the places we have shown we have the power to make things a whole lot better. So I encourage you all not to undermine your earlier partnering and work.

These habitat restoration areas are full of fish and wonderful recreational opportunities. The north Lake Worth Inlet or Palm Beach Inlet, as it's often called, is also supplying irrigation sites for snook in the state. I think it's the third largest spawning site. Whatever goes on there should not go on during snook spawning season. This is a fish vital to the economy and to recreational

opportunities and it's a very sensitive
species, very carefully managed species, and we
don't need to use world class dredging going on
in the summer months.

I'm very concerned also -- and I was glad to hear that you're going to do core borings and analyzes -- I'm very concerned about turbidity from dredging impacting sounding resources inside the lagoon, outside the lagoon and sea grasses, but turbidity booms, things like those, should be strongly contemplated if this goes on.

Safety is a word that has come up a lot. I hope you aren't considering the recreational boating community in your safety part of the cost benefit analysis. This is the safest inlet I'd say probably north of Port Canaveral and south of Cape Canaveral, maybe Ft. Pierce. But compared to Jupiter and Boynton, this inlet is a cakewalk.

I was fishing offshore in a 13-foot Whaler, in somebody's, as a kid. I never had a problem coming in and out of the inlet. So please don't try to give up safety for recreational boating in that analysis. That would be somewhat dishonest.

I'm going to speak as a surfer. On either side of the inlet right about where the B2 sign is and right about where the B1 sign is are two of the best surf breaks in the east coast. B2 is called Pump House, the other one can be referred to as Reef Road. The last time you drenched the inlet after Francis, a lot of that sediment was put in the Reef Road area and it badly degraded the quality of the surf spot. There are thousands of kids and adult kids like me that enjoy that resource, and it generates millions of local economy. People drive from Jacksonville to score these spots. Whatever you do, I think you have noticed how much trouble the surfing foundation can give you all. It can give you a lot of trouble if anything happens to the surf spots.

I have seen a number of cases now to the down-drift beach impacts. I can cite a number of cases. One, the inlets just up drift, Long Beach, Ft. Pierce Inlet, where you all have deepened the inlets and the, quote, need for refurbishment becomes one, two, three, four times more frequent. I think Ft. Pierce has been done four or five times since the inlet was deepened. I think that has something to do with the venturi effect, if I understand the book correctly. Very concerned.

Palm Beach is about out of sand. Dredging has had horrible recreational impacts. They're about out of sand. They might have 20 years left offshore. Please don't make our beaches disappear. Please, please don't do that.

I'm glad you noticed the manatees.

And finally, I uncovered a paper the other day from the Caribbean where a massive dredging project in the Caribbean caused an epidemic of ciguatera. I suggest that you check these sediments not just for what they are in terms of define them geologically, but for contaminants. There's a lot of bad stuff coming in and out on these ships and on other things, and I really don't want to get paralyzed from the snapper I take home.

That's about it.

There are a number of other things, but just on the transparency issue, I have done battle with you guys in a hundred contexts, and this is going to go down transparently because the media is going to be all over it and throughout the whole process.

With that having been said, I know these resources incredibly well, and if you want help finding things or researching things, diving things, I'll be more than happy to help.

Thank you.

MS. BURNS: Thank you for your comments.

Just let me tell you the order of things. Miss Purvis will be next, Dr. Lilja would be next, Mr. Djubin and then Mr. Ward. So if you could, as people get finished, if you could just come on up.

SPEAKER: Good evening. My name is Lynn Purvis, P-u-r-v-i-s. I'm a life-long resident of Palm Beach County. I currently live in Lake Worth but now we're battling to restore the Lake Worth Lagoon so it kind of irks me to be here about them wanting to do further dredging projects upstream.

I'm also representing Everglades Earth First, which is a chapter of the National Environmental Protection Group who -- some things that you're taking on involves things going on in the Everglades where the Army Corps as in the rest of the country has made it their job to totally disrupt ecosystems and wetlands and our waters, so I have a little bit of hesitancy when it comes to Army Corps projects.

Something that doesn't seem to have been addressed in the process I have seen is the convincing of the need for this project. I don't know if that happens somewhere else, but before I want to see a lot of money and effort and expertise get put into studying if this is feasible and environmentally acceptable, I would like to find out if it's necessary.

What is the expected cargo increases that we're going to see coming through here? What exactly is that cargo? I don't know if the Port picks out those kind of statistics that we can see, but I would like to see that and be convinced of the need to bring in bigger ships and more cargo. Specifically, is that the most cost effective way of meeting our needs?

You know, he talks about watermelons, cars, et cetera being brought in here. Well, to me it would seem a much more wholesome and environmentally acceptable and cost acceptable way to be growing those things here and using local industry better. So if we're going to be putting in a lot of money being able to ship in foreign things, I would like to know where the ships are coming to, I would like to see is there a better way to get those needs met locally?

In terms of the cost, as I said, having bigger ships helps bring down the cost of those goods, A: I say that's not the only method; but B: Is that including the cost of this project in all of its aspects or is the Port just taking that as a federal subsidy to their business? Because the cost sharing thing that was mentioned earlier hasn't been broken down. Maybe it hasn't been created yet.

And I really appreciate all the comments that other people have brought up, especially those that are really focused on some of the technical aspects. And I would like to support everything that's been said of the people that have been opposing the project and supporting the no action alternative, and I would like to bring up some more holistic concerns.

I know for those of you up on the panel it's nobody's job description to look at some of these larger issues, but I think that's been one of the main problems with the way that this agency and some of the supporting agencies do business.

So in terms of again going back to what is this cargo that we're bringing in and where are these ships coming from, to me it sounds like a whole lot of oil use because we're shipping in things from afar, and we all know that the larger implications of so much increased petroleum use is war, pollution, and now we're looking at global warming from carbon emissions. I know these are buzz words and people throw them around, but it's real, and I think that those types of things have to be included when we're doing these cost benefit analyzes and when we're creating alternatives.

As you say, you have to look at several different alternatives to the project. I think that those alternatives need to get a little more creative in terms of what is the ultimate goal that we're trying to meet here and are there other ways? Is (sic) there better places to be putting this money to serve those needs?

Not to go back to my other problems, but we have watched the Everglades get totally torn apart in the name of development, in the name of economy, and people finally caught on to how much damage it was actually doing to our land and our peoples and our communities, and there is a lot of outcry against that, and it would be a request to have that restored.

Now, that request has been met with technical agreements to do so; the Everglades Restoration Project. But everyone agrees that project has been languishing out there, never come into play, without ever coming to fruition. So I'm really hesitant to allow yet another project where there's been so little accountability to the residents and the other people who benefit from these vibrant ecosystems.

So I would like to get back to more specific things that you guys might feel more comfortable addressing. Is (sic) there any plans to have the people who are benefiting from this project, those being the business owners at the Port, to participate in any kind of mitigation fund or mitigation project and again, looking into more creative alternatives to meeting our needs? So I appreciate you listening.

I do have one very specific comment for Mr. Dies, who gave the presentation about the data collection. I would say maybe -- we're doing public presentations. You used a lot of technical terms. I know I didn't understand, and I've been trying to follow these things for a long time. So I know you get pressed into a very short time period to get through a lot of material, but I would just maybe try to watch out for trying to explain things in terms that people can understand. But I appreciate it.

Thank you.

MS. BURNS: Dr. Lilja, before you come up, Mr. Sam Osher (phonetic).

SPEAKER: I hope you won't mind. I have got another meeting after this and this is my second meeting today.

UNIDENTIFIED VOICE: What's your name?

SPEAKER: Let me think about that.

Thank you very much. I'm Sam Osher. I'm not an engineer. And I've been listening to some very brilliant people here this afternoon and also people talking about the quality of life, and I'm all for that. I would think before anything is done, there's going to be a study, everything is going to be taken into account, and if the studies don't work out too well, well, okay, it's not going to work out.

However, I want to throat something else into the pot.

You talked about the quality of life and all of that, but from what I see in my vision Palm Beach County is going to grow like you have never seen it before. Businesswise, I think it's going to be one of the most noticed scientific counties in the entire country. It's coming. It's already started. Can't be stopped.

What we need here also -- and I appreciate people talking about the quality of life, and I'd like to see that going on for at least another 30 years personally, but at any rate, there are people out there who need work. Business is coming here, and I hope that things can be worked out so that everybody is pleased. And I'm sure with the brilliance that we have even sitting here, people who we listened to today because their questions and their thoughts are very good, it will be worked out.

The ports south of us are loaded. They can't do much more. This is the ideal place.

And as I was talking to somebody else, from the standpoint of security and naval ships coming in, they're smaller ships, they'll come in. It's extremely important to have this port be used for that. But I want to emphasize, and I'm very much involved in that, I represent a number of clubs, people, and we reach out to perhaps fifty thousand or more voters, and I think that's important. How I got to that point I don't know, but boy, I'll tell you it's important.

So my point is this: I represent a lot of people who still have to work or are looking for work and I would remind the folks here that there are a lot of people here for 40, 50, 60 years, families before, and their work is coming, and whether we like it or not, there's going to be progress upon progress. Sometimes that's not good, but it's gonna happen. It is happening right now. So I want to just throat that into the pot with everything else. We're gonna have to rely on you folks to come up with the answers. I will be here, as you will, and hope for the needs of all of our people.

And by the way, I do want to commend the people that work here at the Port. Lori has been the best thing that's happened to this

Port in about the 10 or 12 years that I've been here.

And I want to thank you for the five dollars you just gave me to say that.

But the point I want to make out is there are two sides: The quality of life, which is extremely important; and then the brilliance of engineers, who can equate everything. May not be able to please everybody, but hopefully you can please most people. It's gonna take a long time, a lot of money, but whether we like it or not, it's going to happen, and you better know it's going to happen. But it could happen in a good way; a way that works out for, hopefully, for everybody. And I expect to be around another 30 years to make sure it happens.

Thank you very much. I've got to get out of here.

MS. BURNS: Thank you folks for letting Mr. Osher go since he had to leave.

Dr. Lilja.

SPEAKER: My name is L-i-l-j-a. I live in Palm Beach. I shall not try to improve on the eloquence of previous speakers that are against this particular project. I will just state the facts the way I see it.

There are two reasons presented for the change: One reason is that present 300-foot vessels are having difficulties running aground, which is a valid reason. The other reason is to open the Port for up to 900 feet mastodons, which will affect the commercial status of this area and at the same time, of course, will hurt the life that we like here today.

I am all for improving the channel for the present size of vessels, and it can be done in different ways. One is to dredge it a little bit deeper than the 32 feet, as we have done before. Just watch out for your pipe that goes from the sand transfer plant.

And the other one is in addition to that, dredge it a little more frequently. Don't wait until it shoals. It's not that difficult. It's elementary.

I will finish with two technical observations. It was said here in the very beginning in the presentation that the Gulfstream is affecting the approach of vessels into the Port. They're being pushed northward by the Gulfstream. I beg to differ. As a boater, we all should know that the Gulfstream is out there, but closer to Port we have a southward bound stream, and I would suggest that the Army Corps look into that one and take that into consideration in their philosophy.

The last thing I have is that we have seen many, many investigations of the sand or the silt that we have here that we're dredging. They differ very much, and always in the benign direction. I would urge you to make sure that you really have a true evaluation of the grain size that we're talking about.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Djubin.

SPEAKER: My name is William Djubin. It's D-j-u-b-i-n. I'm a most recent founder of an environmental organization local here out of Jupiter. Our specifics right now is a coral reef initiative, and we will begin water quality monitoring independently later this month. That will be in collaboration with Reef Rescue of Palm Beach, and most likely the water quality monitoring reports will be translated by Southeast Florida Coral Reef Initiative. That's what we're looking to have here.

I'm not really too sure why I'm here, but I did begin to become confused first in the presentation and then also the speakers' questions.

The presentation seemed as though this was to improve existing navigation in the Port, whereas several people had indicated that we're looking to actually reach out to larger ships and more ships. So I'd like to have that cleared up; as to whether this is for current navigation or whether it is to actually enlarge.

And to add on to previous questions, who is it that -- they're coming here, or is it that we're actually looking to export more?

Living in Florida for 30 plus years I have watched our state go from number one in tourism to now close to number one possibly in energy and agricultural, and our main source of income for the state now is energy and agriculture, and what it appears to be is tourism is number three. I appreciated tourism. I disappreciated (sic) tourism as much as I did appreciate tourism. But I believe that the pollution and the effects of agriculture and energy are taking a stronghold on our state, and in our legislature this must be addressed.

If the expansion of this port is to export agriculture and energy abroad, we need to know that. We need to know those facts. If this is truly just because the ships that need to go from the Port of Palm Beach to the Bahamas and existing islands, that those boats are getting larger and it's becoming unnavigable for them to come in and out of port, we need to know that as well. I'm just a little bit confused as far as whether this is fixing an existing problem or if this is actually trying to enlarge the port to take on more work and more transportation. And those are my questions.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Ward, and then Mr. Williamson will

wind us up.

SPEAKER: I'm Gerald Ward. 31 West 20th St. here in Riviera Beach.

This is a NEPA scoping meeting so we're really not into formalizing for or against positions, but I have to compliment you, Miss Burns, because the last scoping meeting I went to up in Martin and St. Lucie County for a marine minerals management service offshore meeting was a disaster, and it's pleasant to see that you have the reporting accommodated versus what happened up there.

I would request a copy of any summaries, transcripts or documents as a result of this meeting. Plus, pursuant to 40CFR1502.19 subC I'd like to get hard copies of the draft Environmental Impact Statements and the final. I understand you're limiting the written comments to the 20th. If that's not correct -- that's only 11 days away.

The draft schedule says you are proposing to drag this out until the first quarter of 2010. That's two years hence. My experience in economic and NEPA actions is that that's way too long to do it, and pursuant to

40CFR1502.8(c) I request you advance it to no later than the first quarter of 2009. It cuts costs. It will probably not -- if you take an extra year, you probably won't know that much more about this area. And I think it's important. So you have to, I believe, by that regulation have to look at my request.

How many pages are you proposing for this EIS? I hope it's 150 or less. When you get too big, you overwhelm the public in responding, and we need to have the greatest response on this.

The sixth area, which is my last major topic, is scoping alternatives. The alternatives are the heart of an economic statement, an Environmental Impact Statement. It is really an evaluation process of which many questions were thrown out today that people really want an evaluation. You list in the public notice of the scoping meeting only eight areas, all waterside and all increases in the project. Then you list a combination of those eight projects, again all increases, plus the no action. You have indicated numerous physical models, ship models, studies, economic studies, and you have complained about the maintenance of the existing channel because its depth is now six or so feet. Underneath the project, the depth's at 29 feet, apparently. Therefore, you need another alternative to the study; what I think is known as a similar action alternative.

Number One, reduce the project navigation depth. Look at not serving bulk cargo. That seems to be the predominant safety issue that you've gotten into. What would it also do? It would free up existing lip faces. And I think that's in accord with what's happened at the Port. Your economist has got to look at how the cargo traffic has gone up in the Port. And they're not big vessels.

You are between two major deports or ports; Port Canaveral, which has significant military assistance for maintenance, Port Everglades with much less wave climate that does not have a significant maintenance problem. Both have little tributary runoff with no currents except the tidal currents in and out from the straits of Florida or the Atlantic Ocean to the inland waters. They deal

in deep channels for different types of
vessels. The container shipping that has
developed in this port could use more wharfage
and cargo container area. That type of
transportation and similar island trade, which

is small bulk, plus small ferry or cruise vessels have great future at the Port of Palm Beach.

The Port advertises itself as a niche port, and I think you need to go into how they have promoted themselves. It is a small port. Go to the Port of Shanghai and compare it.

The project, eight projects -- and by the way, interestingly, last night we completed the steering committee for a surety of the CRA, Community Redevelopment Agency of the City of Riviera Beach. That project, report, will be out on the 30th of this month and I hope you at least incorporate it by reference.

But one of the things is that the State Comprehensive Plan, Chapter 186 Florida Statutes, requires the 14 deport of ports to start to accommodate the locals in changing their types of uses. So we expect to see the port -- and several suggestions are already being bantered about of how even this building can become more of a common facility for the public of this area.

The project -- I like the man inquiring about A1 and A2, Mr. Gibson. I am not quite sure that's a viable project.

Project I doesn't make any sense except to spend money. It has a bogus name. North Turning Basin Widener. Look at the Corps manuals, Mr. McMillan. That doesn't compute.

Project G probably has the most economic potential. Moving the Port's waterfront faces south along the existing Florida Power & Light Company wharfage or bulkheads could quickly convert more usable area. Ecology impacts are really minimal, and you have to recite in your investigations that less than a century ago it is only because of the Port of Palm Beach and the Florida Legislature that created two ports. Both have port powerage (sic), or they did have when they were created, that has reduced the marine resources within the Lake Worth system of the magnitude that they are today.

Lastly, I guess of a technical nature, water levels, tides, storms and the resulting

surge, the modeling does need to focus on that.
I personally have looked at the tides for the federal government prior and after the mid '60s deepening of the inlet. We basically almost doubled the inlet tide range with that project.

NEPA mandates a host of upland-based considerations. I haven't heard a lot of discussion about that, but it includes economics. This should be an economic driven study, not ecology. We need -- didn't see that man here today, or woman, but they are the driving forces to evaluate what's good for Riviera Beach or the Port or Palm Beach County.

MS. BURNS: Thank you for your comments.

Last but not least, Mr. Williamson.

SPEAKER: I'll bet everybody is happy to see me. I'm last.

My name is George Williamson and I work for Rinker Materials, but now we're called Cemex. We were purchased by Cemex back in July. And what that really means is that we have gone from a company of 13,000 employees that did about 5 billion in business per year to a company that does about 25 billion in sales a year and has about 50,000 employees.

We're a construction materials company. The products that we bring in from literally around the world are used in construction; building roads, schools, houses, bridges. We have two facilities here at Palm Beach. One of them is a cement facility, the other one is aggregate. I'm here to speak on the aggregate side of things.

And in fairness, we are any port's worst nightmare. We are high volume, low dollar material. Everything we do comes in in volume. Big volumes.

We've had our facility here for a while and frankly we have struggled to make it financially viable because of the 28, 29-foot water depth. It is difficult for us to handle business that way economically and we have found ourselves searching for materials as far away as Guiana to bring in in small barges in order to bring the material into the port. Clearly, the deeper it is for us, the better it is. That reduces our costs by bringing it in volume and thereby reduces the cost to our customer, the ultimate user who is building the roads and schools and bridges in the community.

I would just like to say that we wholeheartedly support the Port's effort to deepen this facility. Clearly, 35 feet is just a start for us. We'd love to see it go to 40. Our other big terminals throughout the country are at least 38, 39, 40 feet. We do have some that are a bit shallow because when that happens, when this Port is deepened, we can substantially increase our through port, which means more dollars for the Port and the community, increase our jobs and, most importantly I think, supply a constant -- have a constant supply of quality materials for our customers and the end users.

We also applaud the Corps's efforts to get this far in the survey. Thank you very much.

MS. BURNS: Thank you for your comments.

Okay. Some of you may have some thoughts after this meeting. Again, the comments period for scoping -- and remember, please remember this is not the last time you will have an opportunity to comment -- but for purposes of scoping, which is how we will focus some of our efforts on what we're going to look at, that comment period closes the 20th. So we'll appreciate getting those comments.

First of all, I wanted to thank all of you for staying and helping us try and frame how we will be looking at this project. Again, the next part of the process is we will be taking all of your comments again. We've had a very diligent writer. I have heard her scratching over there. But your comments are important and we wanted to make sure that you can see that your comments were captured.

UNIDENTIFIED VOICE: Can I say something?

MS. BURNS: Sure. Please.

UNIDENTIFIED VOICE: I did my best to get your comments. Please look at them. I know I missed a couple things because speakers were going fast. If you see mistakes, I'll be over there. Let me know and I'll correct it.

Thanks.

MS. BURNS: So please, it's some of the neatest writing I have ever seen, at least from here, so please take a look at it. If you have anything we need to add, this will be the first thing that we probably will take a look at and try and post on the site.

Again, you have those sites to look at.

The next step for us will be taking the information that you have given us today, framing again the study that we'll be doing to try and do the studies and the different things that we need to do to answer some of the questions you have raised and some of the questions all of us have about the project. Again, we're trying to make this as transparent as possible, so if you have any suggestions, please let us know.

Did you have any comment you wanted to make in finishing?

All right. Thank you very much for coming. Grab an apple on the way out. Thanks.

(Thereupon at 5:31 p.m., the meeting was concluded.)

C E R T I F I C A T E

THE STATE OF FLORIDA
COUNTY OF PALM BEACH.

I, Elaine V. Williams, Registered Professional Reporter, do hereby certify that I transcribed the notes of Lake Worth Inlet Feasibility Study public meeting to the best of my ability.

Dated this 6th day of February 2008.

____
Elaine V. Williams, RPR

Summary of Public Comments
Lake Worth Inlet (Palm Beach Harbor) Scoping Meeting
January 9, 2007

(Please note that this summary reflects points raised by speakers during the scoping meeting, as recorded on flip charts during the meeting itself. It may not include all points made by speakers. Further, these notes are not a complete record of comments; a transcription of the meeting is available for those wishing to review a verbatim account. Minor edits have been made for clarity when needed or requested by speakers after the meeting conclusion.)

Susan Markin, Town of Palm Beach resident

- Concerned about Port expansion
- House is near Port on Lake Worth
- Safety issues self-imposed due to bringing in large ships
- Area surrounded by small communities
    - Not Miami or Ft Lauderdale
    - Residents expect small Port with small vessels
- Recreational uses important and are economic generators
- Be cautious about Port expansion and impacts on communities
- Manatee impacts are a concern
- Aesthetic impacts are a concern
- Increased surge potential during storm a concern
- Impacts to sand retention in Palm Beach a concern

Peter Elwell, Town of Palm Beach, Town Manager

- Concerned about size and number of ships
    - Study should clearly identify the existing and proposed ship number and sizes and address the impact of larger and increased vessels
- Concerned about impacts to Peanut Island and recreational vessels (especially in Areas C, E and F) (note: Area F added by speaker after meeting)
- Concerned about water quality impacts due to vessels, especially larger vessels
- Change in coastal dynamics are a concern and technical information to address concerns should be included in the study. Concerns include:
    - Tides and tidal surge
    - Flooding
    - Beach erosion

- Blasting – If it becomes a possibility it will need to be studied and the USACE should notify the public immediately and provide expert information to the public
- Beach Erosion/Inlet Management – Want assurances based on extensive study that conditions will not deteriorate
- 100% of beach compatible sand should be placed on the beach

David Rosow, Town of Palm Beach resident
- North Lake Way resident in Palm Beach
- Naval B. G.
- Opposed to Port expansion
- Enjoy watching Port activities
- Should use tugs to guide in ships if needed; don't expand
- Connecticut has spent a lot of money on Port expansion with little result
- Most of Port traffic goes to islands where large ships are not used
- Will not get ships from China
- Plan is over-reaching
- Doesn't want large ships near his moored yacht
- Concerned about impacts to the north end of the island
- Impacts to people environment (recreation) will out-weigh benefits

Royall Victor III – Town of Palm Beach resident
- Shares many of same concerns as prior speakers
- Who wants expended Port? This area is recreational, doesn't understand who wants expansion.
- Is it true that USACE is CEO of Project?
  - Will information be gathered from all parties including federal, state, and local levels?
  - Who is in charge?

John Turner – represents the Teeter Agency
- His client wants expansion, as do most Port users
- Port capacity is connected to regional economy
- Real and immediate problems with existing shipping, not to mention expansion of shipping industry
- This project is about restoration of existing business, not just expansion
- Lost business = increased in consumer goods cost
- Teeter Agency family business impacted by channel constraints
- Hopes USACE takes methodological approach as win/win for business and environmental concerns

Rich Vogel – Vecenergy

- Asphalt and diesel business
- Maintenance and safety concerns with channel
- Favors dredging
- Have to bring in more small vessels instead of less large vessels due to channel constraints
- Problems with doing business caused by channel constraints
- There is a lot of interest in this Port internationally (including in South America)
- Safe, environmental project favorable

Dick Bresee
- This will be another disaster – don't need study to determine this
- More water and energy in intracoastal and more beach erosion will occur if project constructed
- Principals of gravity – more material will move down grade
- Singer Island – increase beach grade, more sand will move off beach, residence time of sand on beach will be longer
- This will make beach problems worse – sand will not reach Town of Palm Beach
- Sand carried by current dependent on velocity – will get more erosion
- West Palm Beach and Palm Beach having problems with retaining walls
    - Increased volumes of water could negatively impact retaining walls
- Bigger ships – more energy to move ships, more prop wash, more material fluidized
- Instead of expanding channel should dredge continuously – this will resolve shoaling and lessen severity of events
- Compare Port income to beach income
    - Will Palm Beach be an industrial county or good place to live and for tourists?

Dr. Kuvin
- Resident of Palm Beach on north end
- Will be impacted by expansion
- Not navigational safety issue – rather consumer issue
- 40 years ago, USACE here
    - Blasting plus dredging impacted surrounding communities
    - History of inlet and dredging should be addressed by study
    - Residents awarded damages
- Significant environmental damages mentioned in scoping letter
    - Need to be sure that impacts to human species addressed
- 2005 El Paso Gas Seafarer Project
    - Was defeated due to small size of Port

    - Other areas more receptive
    - Commerce responded to local interests
- Area still recovering from hurricane damage
    - Residents should not allow another disaster (this project)
- Noise and air pollution
- Vibrations
- Red mite pollution
- Bilge pollution
- Increased flooding threats, particularly in IWW
- Increase in beach erosion
    - Global warming, hurricanes also
- Project will allow bigger and better and larger ships @ 600-900 feet, which can't turn in turning basin
- Increase in homeland security concerns including increase in terrorism threat and more homeland security vessels in channel
- No Action Alternative
    - Residents urge this alternative
    - Will save tax payer dollars
- USACE under pressure – news article quote
    - Need to discipline dysfunctional agency
    - Spend money where reward will out-do risk
- USACE has done good
    - Maintained inlet and placed sand on beach
    - But not done out of charity
    - Is risk worth commercial reward?

Terry Gibson

- Represents recreational fishing interest and Surfrider member
- Doesn't understand what most aggressive option would be
- Alt A – Are these jetty expansions?
- Value of fishing, reefs, diving
- Proceed with lots of stakeholder involvement
- Seagrass locations important to value of habitat
    - Those closest to inlet support more juvenile reef fishes especially snappers
    - Proximity to reefs – shorter migration which equates to greater survival of fish
- Seagrass assessments in D, F and G understated in presentation
    - Has seen Johnson's seagrass in 30 feet of water
    - Robust communities in project area
    - Need to look at area larger than 150 feet to assess turbidity impacts
- Don't undermine excellent habitat restoration efforts in vicinity

- Snook spawning in inlet
  - Need to avoid impacts to this activity
  - No activity (such as dredging) should occur during spawning
- Turbidity concerns
- Do not consider recreational boating in safety analysis – this is a safe inlet
- Sand should not be placed in inlet
- Inlet deepening could impact beaches
- Manatees could be impacted
- Sediment quality and impacts should be assessed
  - Impact to fish communities
- Keep process transparent
- Will help with information

Lynne Purvis – County resident

- Everglades Earth First representative
- Need for project has not been addressed
  - Before study conducted determine if needed – wants cargo statistics
  - Is project most cost effective approach?
  - Is there better way to get needs met locally?
  - Cost sharing not clear
- Supports all other speakers for No Action Alternatives
- Holistic approach needed
  - Oil needed to ship in foreign goods
  - Global warming, pollution and war should be addressed
- More creative alternatives should be considered
  - Spend money effectively
- Everglades
  - Restoration has been languishing
  - Why allow more impact?
- Will business owners participate in mitigation?
- Use less technical term in environmental presentations

Sam Oser

- Before anything done, there will be a study
- His vision – County is going to grow
  - Will have scientific community
  - But also people who need work
- Hopes for win/win situation
- Ports to south are loaded, this Port ideal for expansion
- Growth, progress will happen whether we like it or not
- Meet needs of all people

- Lori Baer best thing to happen to Port
- Quality of life important, but brilliant engineers will study

Dr. Lilja – Town of Palm Beach resident

- Reasons for change
  - 300 ft vessels running aground – valid concern
  - 900 ft vessels in future – concern
- OK to improve channel for existing vessels
  - Dredge before shoaling
- Gulf Stream
  - Not pushing to north
  - Nearshore current flows to south
- Studies on sand differ
  - Get true evaluation of grain size

William Djubin

- In collaboration with Reef Rescue are starting water quality monitoring
- Confused by presentation
  - Is project for existing navigation or to enlarge channel?
  - Are we trying to increase imports or exports?
  - Economic generators in Florida -1 Energy 2 Agriculture and 3 Tourism
  - If expansion is to increase business, has more concerns

Gerald Ward

- Not appropriate to formalize pro or con positions for scoping
- Requests copies of meeting documents and hard copies of DEIS and FEIS (cited rules and regulations)
- Are comments due in next 11 days?
- Study schedule too long, finish by first quarter 2009
  - Same money – citation requires response to this suggestion
- How many pages will EIS be?
  - Should be less than 150 pages to avoid confusing public
- Alternatives
  - 8 alternatives or combinations
  - Need to add "Similar Action Alternatives"
    - Reduce existing depths – do not serve bulk cargo
    - This will open up more berth space
- Between two major Ports – Canaveral and Everglades
- Increase Island trade and containers
- Small ferry and cruise vessels
- Port is niche Port – small Port

- CRA Report almost complete, needs to be incorporated into study
- State comprehensive Plan requires that Port accommodate public needs
    - Use cruise terminal for public
- A1 and A2 don't make sense
- E doesn't make sense – contrary to USACE manuals
- G most economic potential – will use FPL bulkheading
- Ecological impacts minimal
    - It is only because of Port that resources are what they are now today
- Tides and surge
    - 1960's deepening almost doubled tidal range
- Economics should drive study

George Williamson – Cemex (formerly Rinker)

- Construction materials company with two facilities in Palm Beach (cement and aggregate)
- Aggregate business at Port struggling due to channel constraints
- Deeper is better – volumes reduce customer costs
- Supports efforts to deepen
    - 40' good
    - Can substantially increase input
    - Ensure supply to users

GENERAL CONTRACTORS

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January 9, 2008

DEPARTMENT OF THE ARMY
Jacksonville District Corp of Engineers
P.O. Box 4970
Jacksonville, FL 32232

Attn: Marie G. Burns, Acting Chief, Planning Division

Re: Lake Worth Inlet/Palm Beach Harbor Feasibility Study NEPA Documents

Dear Sir:

I am writing you as directed from 6th of December 2007 notice. As an adjacent property owner, located North of The Port of Palm Beach, I object to your Plan (Figure 1, [specifically Area E] – Expansion Alternatives Proposed for Lake Worth Inlet (Palm Beach Harbor) as presented. I am concerned that our upland interests and waterfront improvements which date back to the early 1940's are being proposed for impairment by this process.

In conclusion, I ask that 'Area E' be removed from the Environmental Impact Statement for the Expansion of Lake Worth Inlet (Palm Beach Harbor), FL Draft Environmental Impact Statement (EIS). Further, I wish to be copied on any government or private party correspondence or documents related to the above during this entire EIS process

Sincerely,
THE MURPHY CONSTRUCTION CO..

By: [signature]
Martin E. Murphy
Vice President

cc: • Rick MacMillian, Jacksonville District, Project Manager
Lori Baer, Executive Director, Port of Palm Beach

Florida Fish and Wildlife Conservation Commission

Office of Policy and Stakeholder Coordination
Mary Ann Poole Director
(850) 410-5272
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January 10, 2008

Ms. Lauren Milligan
Florida Department of Environmental Protection
Florida State Clearinghouse
3900 Commonwealth Boulevard, MS-47
Tallahassee, FL 32399-3000

Re: Palm Beach County, SAI #FL200712103896C, Notice of Intent to prepare a Draft Environmental Impact Statement for expansion of Lake Worth Inlet (Palm Beach Harbor) including widening and deepening of the existing channels and turning basin

Dear Ms. Milligan:

The Florida Fish and Wildlife Conservation Commission's (FWC) Aquatic Habitat Conservation and Restoration Section has coordinated a preliminary agency review of the potential wildlife and wildlife habitat issues associated with the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida. This letter outlines the anticipated concerns and comments related to the feasibility study and proposed Draft Environmental Impact Statement.

Background

The U.S. Army Corps of Engineers (USACE) is performing a feasibility study for the expansion of Lake Worth Inlet (Palm Beach Harbor). The expansion alternatives being reviewed include no action, creation of channel flares, channel deepening and widening, and turning basin expansion. Options for the disposal of dredged material include Peanut Island, disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site, beach placement, disposal of suitable rock at existing artificial reef sites, and any other viable disposal options that may become available. The USACE intends to prepare a Draft Environmental Impact Statement for this project. The Port of Palm Beach District is the cooperating agency and non-federal sponsor for this project and will provide information and assistance on the resource assessment and mitigation measures and alternatives.

Wildlife

Marine Turtles: The coastal beaches both north and south of Lake Worth Inlet provide nesting habitat for the loggerhead (*Caretta caretta* - threatened), leatherback (*Dermochelys coriacea* - endangered), and the green sea turtle (*Chelonia mydas* - endangered). Construction activities associated with sand placement on these beaches during the marine turtle nesting season (March 1 through October 31) could adversely affect nesting turtles, incubating nests, and emergent hatchlings. The compatibility of sand placed on the nesting beach may also adversely affect the ability of nesting females to construct viable nests and the incubation environment necessary for successful development and escape of marine turtle hatchlings.

Nearshore hardbottom communities and artificial reefs provide foraging, resting and juvenile developmental habitat that could be adversely affected by the expansion of channels associated with this project. Blasting to remove limestone during deepening or widening of channels could be lethal to marine turtles and manatees if it occurs relatively close to individual animals.

Manatees: The Florida Power & Light Riviera Beach power plant located immediately south of the port provides an important winter warm-water refuge for the Florida manatee (*Trichechus manatus latirostris* - endangered). During winter cold fronts, over 400 manatees have been documented using this warm-water refuge. The desired turning basin expansion would encompass the area adjoining this warm-water habitat. Construction activities may directly affect manatees using this site if work is conducted during the cold season (November 15 through March 31), or indirectly by creating a deterrence to the use of this important habitat.

Secondary adverse affects could include altering the nature of the warm-water refuge. Substantially deepening the bathymetry adjacent to the warm-water refuge could result in reduction of warm-water habitat due to an increase of the mixing between the cooler water from the expanded turning basin with the thermal outfall of the power plant. Expansion of the turning basin is also expected to affect seagrass resources that provide forage for manatees. Increased shipping traffic may also increase the risk to manatees due to its proximity to the warm-water refuge and to the travel corridors used to access foraging areas located north of the port.

Habitat

Corals and Hardbottom: Hard corals may be found within the inlet channel and the area marked as "south channel flare" and "north channel flare" on the map provided by the USACE labeled "Study Areas for Potential Improvements (Widening and Deepening)." In addition, the nearshore areas that may be affected by this project fall within the range of staghorn coral (*Acropora cervicornis*), which was recently listed federally as a threatened species. Other hardbottom resources occur on the walls of the existing channel and potentially in the nearshore channel expansion areas. The primary benthic resources expected to be found within the prospective expansion areas include live bottom (soft corals and sponges), solution holes, limestone ledges, and their associated communities.

Potential adverse effects to these benthic resources could result due to dredging, blasting, and sediment disposal. Expansion of the offshore disposal area may also affect hardbottom resources, which will need to be considered if this option is explored.

Seagrass: Six species of seagrass have been documented in Lake Worth Lagoon and all could be affected by the dredging necessary to expand the inlet channel and turning basin. Seagrass species found in Lake Worth Lagoon include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*) and the threatened species Johnson's seagrass (*Halophila johnsonii*). Seagrasses provide important ecological functions to estuarine and marine coastal systems. A wide range of organisms are directly or indirectly dependent upon seagrasses for food and habitat (Zieman and Zieman1989), including several federally and state-listed endangered species such as green sea turtle and Florida manatee.

Seagrasses, coral, and hardbottom also provide essential fisheries habitat by creating a physically stable refuge and nursery ground for numerous commercially and recreationally viable fish and invertebrates (Zieman 1982, Phillips and Meñez 1988, Fonseca et al. 1988).

Artificial Reefs

Any dredged material that would be considered for disposal at an artificial reef site will need to meet appropriate criteria for artificial reef construction depending upon the proposed deployment location and material types. No silt, sand, clay (of any type), or rock boulders less than 150 pounds each will be allowed to be deployed in the artificial reef site. Ideally, the minimum acceptable weight of each individual piece of rock proposed for artificial reef deployment should weigh at least 500 pounds. Close coordination with the FWC Artificial Reef Program (Attn: Jon Dodrill, FWC-Division of Marine Fisheries Management) and Palm Beach County Artificial Reef Coordinator (Dr. Janet Phipps) will be required if artificial reefing is considered as a disposal option.

Peanut Island

Peanut Island contains a large habitat enhancement project that includes a 7.1-acre maritime hammock, 3 acres of mangroves, 1.5 acres of tidal channels and ponds, 3 acres of shallow-water lagoons and 1.3 acres of shallow-water reef. All of these habitat features provide habitat for a variety of wildlife including shorebirds, fish, crustaceans, and mollusks. Placing spoil on the island and widening the channel in segments C, D and E could adversely affect these habitats.

Resource Surveys

We recommend that multiple resource surveys be conducted as well as a review of historical data in order to evaluate the potential affects of this project on the wildlife and marine habitats that are present within the scope of the project. The draft Environmental Impact Statement should include the results of seagrass surveys within the project boundary areas of Lake Worth Lagoon and the inlet, as well as the results of surveys of hardbottom and coral surveys within the inlet channel and the inlet flares, with special attention paid to the finding of any staghorn coral. We offer our expertise and assistance in developing the protocols for the resource surveys due to their importance in the determination process of the feasibility of the options suggested in this scoping effort.

Summary

Expansion of the Lake Worth inlet channel and turning basin has the potential to adversely affect numerous wildlife and habitat resources of the state of Florida. Many difficult environmental hurdles would need to be overcome for the full extent of this project to come to fruition. We recommend that the USACE and the Port of Palm Beach give great consideration to the natural resources that would be affected during a project of this nature when assessing the information and determining the feasibility of the expansion options.

We appreciate the opportunity to provide input during the scoping process for the Navigation Feasibility Study for the expansion of the existing channels and turning basin of Lake Worth Inlet (Palm Beach Harbor). Please continue to notify Ron Mezich of all future meetings, information exchanges, and requests for comments regarding this potential project. Should you require additional assistance regarding our comments, please contact him at (850) 922-4330 or at ron.mezich@myfwc.com.

Sincerely,

Mary Ann Poole

Mary Ann Poole, Director
Office of Policy and Stakeholder Coordination

map/rrm
Lake Worth Inlet 1182
ENV 1-3-2
cc: K. Cairns, USFWS, Vero Beach
J. Valade, USFWS, Jacksonville
J. Karasia, NMFS, Miami
P. Davis, PBC-DERM, West Palm Beach

Literature Cited

Fonseca, M.S., W.J. Kenworthy, and G.W. Thayer. 1998. Guidelines for the conservation and restoration of seagrasses in the United States and adjacent waters. National Oceanic and Atmospheric Administration, Coastal Ocean Program Decision Analysis Series No. 12, NOAA Coastal Ocean Office, Silver Spring, MD. pp. 1-222.

Phillips, R.C., and E.G. Menez. 1988. Seagrassses. Smithsonian Institution Press. Smithsonian Contributions to the Marine Sciences. Number 34, pp. 1-104.

Zieman, J.C. 1982. The ecology of the seagrasses of south Florida: A Community Profile. U.S.Fish and Wildlife Service., Office of Biological Services, Washington, D.C. FWS/OBS-82/25, 158pp. (Human Impacts p.84-90).

Zieman, J.C., and R.T. Zieman. 1989. The ecology of the seagrass meadows of the west coast of Florida: a community profile. U.S. Fish and Wildlife Service, Biological Report 85 (7.25). Washington, D.C.

Project Information	
Project:	FL200712103896C
Comments Due:	01/11/2008
Letter Due:	01/21/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - SCOPING NOTICE - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EXPANSION OF LAKE WORTH INLET (PALM BEACH HARBOR) - PALM BEACH COUNTY, FLORIDA.
Keywords:	ACOE - SCOPING - EXPAND LAKE WORTH INLET/PALM BEACH HARBOR - PALM BEACH CO.
CFDA #:	12.107

Agency Comments:

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL

The proposed study is not in conflict or inconsistent with the Strategic Regional Policy Plan. It furthers Regional Goal 7.1 that calls for a balanced and integrated transportation system.

PALM BEACH -

COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

The FWC has provided a number of comments regarding the potential direct and secondary impacts of: 1) beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings; 2) turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the Florida Power & Light Riviera Beach power plant south of the port; 3) dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrass, corals and hardbottom resources; and 4) Peanut Island dredged material placement on wildlife habitat. FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.

STATE - FLORIDA DEPARTMENT OF STATE

No Comments Received

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The DEP Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers comments on the potential effects of the project on: the existing sand transfer plant at the inlet, Peanut Island and other proposed upland disposal sites, seagrass beds around Peanut Island, the FP&L plant warm-water manatee refuge and current inlet hydraulics. Continued coordination with the DEP Bureau of Beaches and Coastal Systems and FWC to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.

SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Released Without Comment

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161

1-12-08

Ms C. L. Brooks
Planning Division
Dept of the Army
P.O Box 4970
Jacksonville, Fl. 32232-0019

Re: Port Channel, Palm Beach County Widening

I am sending our comments regarding the above Subject.

Our option is to take no action on the widening!

This Widening if implemented will be the demise of the Manatee. Grass Beds will be impacted along with the reefs. Peanut Island has just been restored, and certainly will be impacted.

We don't Need larger vessels here, just because a cargo client is losing business!

Sincerely
Stella Rossi
Coalition for Wilderness Islands
Founded 1982

625 Whispering Pines Rd
Boynton Bch Fl. 33435

PURPOSE: SCOPING MEETING - Environmental Impact Statement for Palm Beach Harbor, Feasibility Study of Navigation Improvements
DATE: 9 January 2008
LOCATION: Riviera Beach, FLORIDA (Port of Palm Beach)

RECEIVED
JAN 22 2008

REID HANSEN
NAME AND TITLE (PLEASE PRINT)

Myself
BUSINESS OR ORGANIZATION YOU REPRESENT

131 DATE PALM DR
MAILING ADDRESS

LAKE PARK, FL 33403
CITY, STATE, ZIP CODE

captainhansen@yahoo.com
EMAIL ADDRESS

Mail Your Comments to:

U.S. Army Corps of Engineers
Attention: PD-EC
P.O. Box 4970
Jacksonville, Florida 32202-4412

YOUR COMMENTS OR NOTES BELOW:

see typed sheet attached

BY JAN 20

PRIVACY ACT STATEMENT

AUTHORITY: 42 USC 4321, 4331-4335
PRINCIPAL PURPOSES: Information on this card is used for organization and conduct of this meeting. It may be added to the mailing list for notification of future meetings on the topic and for addressing correspondence subsequent to the meeting.
ROUTINE USES: This information is a public record and may be disclosed to other Federal or local agencies for governmental purposes as well as to private individuals and organizations under the Freedom of Information Act.
MANDATORY OR VOLUNTARY DISCLOSURE: Completion of this card is voluntary. However, failure to supply the information requested may result in your (or your agency's) omission from further notification regarding participation in the process.

January 18, 2008

When determining whether or not the Port of Palm Beach should be revitalized with widening, deepening, and any expansion in general, there are many considerations that must be taken into account. However, the affect on the greater good, or, the big picture, is most important. It is Lake Worth Inlet itself that has provided the surrounding areas and people with economy, employment, and recreation. People in protest seem to forget this. Ports are highly valued economic hubs for shipping and trade and therefore extremely important to not only local economies, but the state and national economy as well. The opinions of the protesting multi-millionaires on Palm Beach, who are worried about their view and width of their private beaches, have no merit. The greater good for the economy, while taking safety and/or any fragile environmental issues into consideration is of the utmost importance in this matter.

RH

Reid Hansen
Palm Beach Pilots

Florida Department of Environmental Protection
Coral Reef Conservation Program
1277 NE 79th Street Causeway
Miami, Florida 33138

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

RECEIVED
JAN 2 2 2008

January 18, 2008

Ms. Catherine L. Brooks
U.S. Army Corps of Engineers
Jacksonville District, Planning Division
Environmental Section, P.O. Box 4970
Jacksonville, FL 32207

RE: Notice of Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

Dear Ms. Brooks:

The Florida Department of Environmental Protection (FDEP) Coral Reef Conservation Program (CRCP) has reviewed the above-referenced Notice of Intent and the information presented by the U.S. Army Corps of Engineers (USACE) and its contractors at the public and agency scoping meeting held at the Port of Palm Beach on 9 January 2008. The FDEP-CRCP recognizes the importance addressing navigational safety issues and maintaining infrastructure necessary to support the economy of the State of Florida, when conducted in accordance with management practices that are appropriate for the exceptional natural resources in the proposed project area. Our environmental concerns, comments and recommendations are provided below to support the development of a comprehensive Feasibility Study and Draft Environmental Impact Statement by USACE for the proposed Lake Worth Inlet project.

Project Need/Justification

The FDEP-CRCP understands the navigational safety issues associated with shoaling which has reduced the authorized depth of the Lake Worth Inlet channel from 33' to 29', and that a project to conduct channel depth maintenance may be necessary. However, the need for the proposed Lake Worth Inlet expansion project, including widening and deepening of existing channels and turning basins, has not been demonstrated. Adjacent ports, at Port Everglades and the Port of Miami, are currently planning or preparing (respectively) to undergo major expansion projects, and therefore, an additional expansion project for the Port of Palm Beach may not be necessary or appropriate. The need for these three, or even two of these, ports within the 83-mile distance from the Port of Miami to the Port of Palm Beach to accommodate larger, deeper-draft vessels must be evaluated as a fundamental component of the economic analysis prepared for the feasibility study for this proposed project.

The economic analysis must also address the exceptional natural resources in the proposed project area, including their economic value and the economic losses associated with impacts to these natural resources. For, example, a study by Johns et al. (2001) concluded that the reef resources in Palm Beach County generate $699 million dollars in annual sales and income, and support 6300 jobs in the County. The economic value of reef resources in Miami-Dade and Broward counties is even greater. Due to the presence and economic importance of the extensive nearshore and offshore sensitive coral reef communities, endangered species, seagrasses, and other sensitive marine habitats and animals which lie within the footprint and surrounding area of the proposed project, the FDEP-CRCP strongly encourages consideration of alternative port expansion project locations in the feasibility study, where the potential impacts to valuable natural resources and the multi-decadal timescales required for resource recovery are fewer than in southeast Florida. FDEP-CRCP also notes that the intrinsic value of these natural resources to the citizens and businesses of Palm Beach County is exceptionally high, as demonstrated by local community members who voiced opposition to the proposed project during the public comment period of the recent scoping meeting.

Offshore Hardbottom and Coral Reefs

The proposed Lake Worth Inlet channel and flare expansion would directly impact hardbottom and coral reef communities. As cited above, in addition to supporting a diverse assortment of marine life, hardbottom communities and coral reefs drive an important economic engine in southeast Florida. These reefs support a thriving and economically indispensable tourism industry, as well as recreational and commercial fisheries, and provide shoreline protection. Dredging activities pose significant risks and may cause irreversible harm to hardbottom communities from potential increased turbidity and direct impacts from dredging equipment. Mitigation using artificial reefs can never fully replace a natural reef community. Further, the cost and challenges of providing mitigation at scales which attempt to compensate for the loss of ecological services following project construction may be greater than the economic benefits derived from project construction.

Nearshore Hardbottom and Seagrass Communities

The ecological relationship between seagrasses and coral reefs is inseparable and irreplaceable. Impacts to either community carry severe repercussions to both, including loss of critical habitat, fisheries stock, and primary productivity. Hardbottom and seagrass communities provide important habitat to numerous adult and juvenile fishes and foraging and resting grounds for sea turtles. Of particular note, the Lake Worth Inlet is known to be one of the largest of the few remaining snook spawning sites on the Atlantic Coast. Burial or dredging of nearshore hardbottom and seagrass communities will result in loss of habitat, biodiversity, foraging grounds, and natural shoreline stabilization and protection. Mitigation for hardbottom and seagrass communities cannot avoid or replace the associated organismal and biodiversity losses.

The proposed channel and turning basin expansion and anticipated increase in subsequent beach nourishment (due to increased post-project construction erosion) will directly and permanently impact these important nearshore habitats through direct habitat destruction (i.e. removal by dredging), and burial of the hardbottom by smothering the associated algal, sponge, coral and worm reef communities from sand placement and offshore sand migration after placement.

Nearshore and Offshore Softbottom/ Sandy Habitat

It is also important to note that sandy and softbottom seafloors, bays and lagoons provide an important, unique, but often overlooked habitat for numerous meiofauna –organisms that live and move among the grains of sand – as well as other marine fauna which bury themselves (e.g. flat fishes, stingrays), live in burrows in the sand (e.g. burrowing anemones, molluscs), or forage for food in softbottoms (numerous fishes, invertebrates and marine mammals). Blasting and dredging activities and offshore migration of sand placed on the beach can displace and/or destroy many of these fauna, and should be avoided or minimized. Destruction of this habitat may cause significant ecological repercussions.

Study Design

At the scoping meeting, USACE representatives stated that funding has been received, and the firm PBS&J has been contracted, by USACE to comprehensively survey the aquatic resources which will be impacted by the proposed project. However, the sampling design presented by Don Deis of PBS&J is inadequate to address the (1) extent and nature of potential project impacts, (2) options for minimization of impacts, and (3) the amount and appropriate mitigation required to compensate for resources destroyed by the construction of the proposed project, should it be approved. Of particular concern, we note that the surveys of the potential project impact areas A1 and A2, as well as the channel floor (project area B), and channel walls (project areas B1 & B2) are limited to towed video sampling. This methodology by itself is insufficient to address questions which must be answered by the survey. Diver surveys, both inside and adjacent to the proposed impact areas, incorporating an appropriate suite of sampling methodologies and replication must be performed to provide the ecological data necessary to fully evaluate the proposed environmental impacts associated with this project. FDEP-CRCP would be pleased to work with USACE and PBS&J to develop a comprehensive survey protocol, and would appreciate the opportunity to review and recommend specific modifications to the survey protocol in advance of the actual survey period.

For example, FDEP-CRCP encourages USACE and PBS&J to incorporate an active and directed *Acropora* spp. (Elkhorn and Staghorn coral) search into its survey protocol. We define an active search as surveying an area while specifically seeking to locate and enumerate target species. In light of the recent designation of these two coral species as Threatened under the U.S. Endangered Species Act, and the documented evidence that reefs throughout southeast Florida historically and currently provide suitable habitat for these threatened species, it would be a gross oversight to exclude an active search for these species in the study design and report. Other factors, such as the classification of stony coral, octocorals and barrel sponge size classes also need to be considered.

The total potential area of impact is not clear. The total areas should include identification and percent cover of marine resources (in hectares and acres) defined as "live cover" (i.e. scleractinians, hydrocorals, octocorals, sponges, turf algae and macroalgae) including the natural areas of sand and uncolonized hardbottom which normally occur on reefs in southeast Florida. These areas need to be surveyed and mapped in detail to determine the extent of marine resources they include, and the total area of potential impact should include and evaluation of these areas. The study should also provide information on the impact to the nearshore and offshore softbottom or sandy habitat. Finally, the total anticipated area of both direct impacts and indirect impacts from the expansion of the Port of Palm Beach must be clearly defined.

<u>Beach Erosion</u>

FDEP-CRCP has concerns regarding the beach erosion and associated consequences that may result from construction of this project, including but not limited to:

- Impacts to nearshore and hardbottom resources.
- Sediment and turbidity associated with project construction methods (e.g. an inadequate buffer zone of 150ft has been proposed for this project).
- No accounting for potential impacts beyond the buffer zone.
- Subsequent need to re-nourish affected beaches which will exacerbate impacts to nearshore and hardbottom resources.
- Lack of suitable beach nourishment sand sources compatible in both grain size and composition.

In addition to the concerns addressed above, recreational activities including swimming, snorkeling, diving, and fishing may also be adversely affected by the proposed Lake Worth Inlet expansion project, and anticipated subsequent increased frequency of beach nourishment projects, due to increased turbidity and loss of habitat and biodiversity. Increased environmental pollution, road traffic, development, and infrastructure necessary to support increased maritime activity and port commerce must be considered and will impact the surrounding residential communities, as well as the greater south Florida area. Construction of this project may result in substantial, irreplaceable, and potentially unnecessary losses to the State of Florida.

The FDEP Coral Reef Conservation Program recommends that alternative ports in the State of Florida be thoroughly investigated for their potential to accommodate deeper draft vessels and increased maritime activity, in lieu of the ports in southeast Florida (e.g. Port of Palm Beach and Port Everglades). The extent of potential marine resource and associated environmental impacts from newly proposed channel deepening and widening (if needed) at alternative Ports should be compared to the proposed resource impacts anticipated to result from port expansion projects in southeast Florida. The FDEP-CRCP requests full consideration of all potential methods and alternatives which address the stated No Action alternative for this project. As further information about this project is made available by USACE, we anticipate providing additional comments and recommendations.

Please copy me on any further activities and communications regarding this proposed project at Chantal.Collier@dep.state.fl.us.

Sincerely,

Chantal Collier

Chantal Collier
Coral Reef Program Manager
Office of Coastal and Aquatic Managed Areas
Florida Department of Environmental Protection

cc via e-mail:
Stephanie Bailenson, FDEP-CAMA
Dan Bates, Palm Beach County ERM
Marie Burns, USACE
Paul Davis, Palm Beach County ERM
Lisa Gregg, FWC
Jocelyn Karazsia, NOAA-NMFS
Vladimir Kosmynin, FDEP-BBCS
Audra Livergood, NOAA-NMFS
Stephen MacLeod, FDEP-BBCS
Ellen McCarron, FDEP-CAMA
Erin McDevitt, FWC
Janet Phipps, Palm Beach County ERM
Joanna Walczak, FDEP-CRCP

Literature Cited:
Johns GM, Leeworthy VR, Bell FW, Bonn MA (2001) Socioeconomic Study of Reefs in Southeast Florida. Final Report. Hazen and Sawyer Environmental Engineers & Scientists

Powell

Department of Environmental Resources Management
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West Palm Beach, FL 33411-2743
(561) 233-2400
FAX: (561) 233-2414
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January 22, 2008

Ms. Marie Burns, Acting Chief
Planning Division (PD-EC)
US Army Corps of Engineers
PO Box 4970
Jacksonville, Florida 32202-4412

SUBJECT: PALM BEACH HARBOR EIS/FEASIBILITY STUDY

Dear Ms. Burns:

The Department of Environmental Resources Management (ERM) has conducted a preliminary review of the issues associated with the proposed expansion of Palm Beach Harbor and Lake Worth Inlet. While the Port has been working closely with Palm Beach County to improve the management of the inlet and Peanut Island, the proposed project will have major environmental impacts that need to be addressed in the Feasibility Study and Environmental Impact Statement. Palm Beach County has agreed to support this study to get a better understanding of project alternatives and their impacts.

PROPOSED WORK

The study will evaluate options for widening and deepening the Lake Worth Inlet and expanding Palm Beach Harbor to improve navigation safety, improve port efficiency and to accommodate larger ships. Potential expansion alternatives include no action, channel deepening, channel widening, addition of channel flares offshore, and expansion of the turning basin to the north and south as outlined on the enclosed map.

HABITAT ISSUES

- One of the primary concerns is that dredging will destroy valuable seagrass, hardbottom and softbottom resources. Depending on the extent of dredging proposed, the potential exists for negative impacts to offshore reefs and the artificial reefs within the channel flare footprint (Study Areas A1 and A2), hardbottom communities on the inlet channel walls (Study Area B), hardbottom and seagrass communities east of Peanut Island (Study Area C), and seagrass communities (Study Areas D, F and G). Additionally, substantial amounts of shallow, productive softbottom supporting a diverse invertebrate community may be eliminated in all study areas.
- Surveys of these habitats that have been performed by ERM are not sufficient to address potential impacts from the proposed work. Detailed resource surveys will need to be conducted to adequately characterize each study area.
- While some of the resources that will be affected have been created by man (artificial reefs, channel walls, hardbottom rubble), these communities have been established for decades. They have been colonized by hard corals, soft corals, and sponges, support recreationally and commercially species (including lobsters), and provide important environmental functions that need to be recognized in the study.
- The seagrass beds within the project limits are some of the most diverse in the county with at least 5 species documented to occur. These beds have additional

significance given the proximity to the manatee aggregation site at the Florida Power and Light (FPL) warm-water discharge.

- Mitigation for seagrass impacts at the scale being considered will have a poor chance of success in Lake Worth Lagoon. The most likely method to mitigate for any seagrass impacts would be to fill large portions of the Lake Worth Lagoon to raise the bottom to the photic zone. The only location near the inlet where mitigation at this scale could be constructed is located about 1 ½ miles south of the inlet. It is unlikely a sufficiently large mitigation project could be constructed here since it is expected to have additional significant impacts to nearby seagrasses, benthic invertebrates, navigation, and flushing of the lagoon. Further, based upon their limited distribution in the lagoon and their light and nutrient requirements, it is highly unlikely that manatee grass (*Syringodium filiforme*) or turtle grass (*Thalassia testudinum*) would grow at this location. For these reasons, every effort should be made to significantly reduce or eliminate seagrass impacts.
- The proposed dredging is in direct conflict with the Lake Worth Lagoon Management Plan which lists seagrass preservation as one of its priority objectives, and the Coastal Management Element (CME) of the Palm Beach County Comprehensive Land Use Plan, which has a goal of preserving and protecting coastal resources.
- Impacts to water quality and the potential for increased flushing in the Lake Worth Lagoon need to be evaluated. While it is likely that increased oceanic water in the lagoon will provide benefits from improved clarity, there will be changes in lagoon salinity that may affect a number of other species that need to be evaluated. It is recommended that predicted changes in salinity in the lagoon be evaluated using an existing model (Zarillo, 2003). Additionally, the potential for increased flushing of nutrient rich lagoon waters onto offshore reefs needs to be considered.

LISTED SPECIES ISSUES

- Manatees are the listed species most affected by this project which is located where the majority of manatees are found in the county. The FPL discharge provides an important warm-water refuge for hundreds of manatees in the winter. Alterations to the basin near the discharge are likely to affect manatees and will be one of the most challenging impacts to offset.
- Sea turtles utilize a number of habitats in the project area including the beaches, reefs, seagrass beds, and inlet jetties. Recent studies conducted by ERM have documented juvenile green turtles utilizing seagrass beds 1 ½ miles north of Palm Beach Inlet and they may be using the beds south of the inlet. Juvenile green and hawksbill turtles utilize nearshore reefs near the inlet. Juvenile green turtles have also been killed during maintenance dredging of the inlet indicating that they may be foraging on algae found on the rocks (similar to those observed in the Trident submarine basin in Port Canaveral and Brazos Santiago Pass in Texas). Four species of sea turtles (loggerhead, green, leatherback, and hawksbill) utilize the nesting beaches adjacent to the inlet and five species (loggerhead, green, leatherback, hawksbill, and Kemp's ridley) occur in the ocean near the inlet.
- Lighting at the Port is currently impacting sea turtles. High mast lighting that has been added during recent Port renovations that increased illumination in the coastal area, has been implicated in sea turtle hatchling disorientation incidents on Palm

Beach Shores, and probably contributes to many other disorientations in the area. Increased cargo traffic will likely mean increased coastal lighting impacts in the cargo handling area. Port lighting should be evaluated during the EIS process to determine methods for achieving sufficient illumination for port operations while minimizing the amount of light trespass off the property.

- Johnson's seagrass (*Halophila johnsonii*) is one of the most commonly occurring seagrasses in Lake Worth Lagoon. Impacts from dredging and sedimentation, as well as alterations to salinity and water clarity will impact this threatened species.
- Whales, including humpback and right whale, have infrequently been observed in the inlet and in adjacent waters.
- The Lake Worth Inlet is one of the most important areas for several species of the Atlantic population of snook (*Centropomus* spp), a species of special concern. Thousands of snook utilize the inlet and nearby structure during summer spawning aggregations and return to this location every year.
- Construction will have to be timed to minimize impacts in the winter to manatees and during the summer to nesting sea turtles and spawning snook. Another consideration in determining timing of construction is that offshore currents tend to be stronger in summer which would increase flushing, dilution and transportation of a turbidity plume.
- The public notice stated that blasting may not be necessary for this project. However, based upon our understanding of the geology, previous dredging at this inlet, and recent dredging in the Port of Miami, we expect that there will strong economic incentive to use blasting. Any consideration for blasting must take into account the impacts to listed species and fishes.

INLET AND BEACH MANAGEMENT ISSUES

- The Lake Worth Inlet is already the primary cause of erosion of downdrift beaches. Any widening and deepening of the inlet and the nearshore will alter the wave climate and littoral sand transport which could increase the loss of sand to the downdrift beaches. Any impacts will require an increase in the amount of sand bypassing and beach nourishment (which can have negative impacts) to compensate. The costs to mitigate for downdrift beach impacts must be clearly and fully defined.
- All beach compatible sand must be placed on the beach. There may be options for disposing of non-beach compatible material in existing dredge holes in Lake Worth Lagoon. Use of the offshore spoil disposal area should be only as a last resort since there are important deep reef habitats downstream from the disposal area. Geotechnical work should be performed as part of this study to adequately characterize the sediments and determine the quantities that will be available for disposal at the different sites.

PORT OPERATIONS

- Expansion of the inlet and turning basin to accommodate larger ships will have secondary impacts that should be addressed in the EIS.
- Concerns have been raised recently about potential damage associated with the existing anchorage area and a study has been initiated to evaluate options for

revising the anchorage area. This issue should be addressed in the EIS since the ships that would be using the anchorage are usually associated with the Port.

- ERM currently uses the lot west of Study Area G as the artificial reef construction staging area. In the event the Port acquires this site for expansion. ERM would like to receive assurances that there will be provisions for such a staging area in future Port plans.

RECREATION ISSUES

- NEPA requires that impacts to recreation be evaluated. The inlet vicinity is heavily used by boaters, fisherman, snorkelers, divers, surfers, and the general public.
- Safety issues will need to be evaluated since larger ships operating close to a popular park (Peanut Island), amidst large numbers of recreational and commercial small craft, and near popular dive sites is likely to increase the chance of accidents.
- Dredging of the channel flare (Study Area A) will affect wave generation that may alter local surf conditions. Given the quality and popularity of the Reef Road and Pump House surf breaks, it is recommended that potential changes to the surf be evaluated.
- Erosion of the southeast corner of Peanut Island has necessitated increasing amounts of armoring to protect recreational amenities. Dredging the channel deeper and closer to the island will allow for increased wave and current energy to alter the shoreline and threaten additional amenities. Those impacts and costs should be evaluated.

BENEFIT/COST

- A key determinant of feasibility is the benefit/cost ratio of each alternative. It is requested that, in addition to construction costs, the true costs to all the resources be included in the analysis. This would include costs for mitigation, monitoring, increased beach and inlet management, and loss of recreation resources.

In summary, a thorough study is necessary to adequately evaluate alternatives. Given the extent of potential impacts, it does not appear that it is possible to construct all components of the project without significant environmental effect. The challenge will be to develop a plan that meets some of the Port's goals while minimizing impacts.

Thank you for the opportunity to provide comments. Please call me at 561-233-2400 or Mr. Paul Davis at 561-233-2509 if you have any questions.

Sincerely,

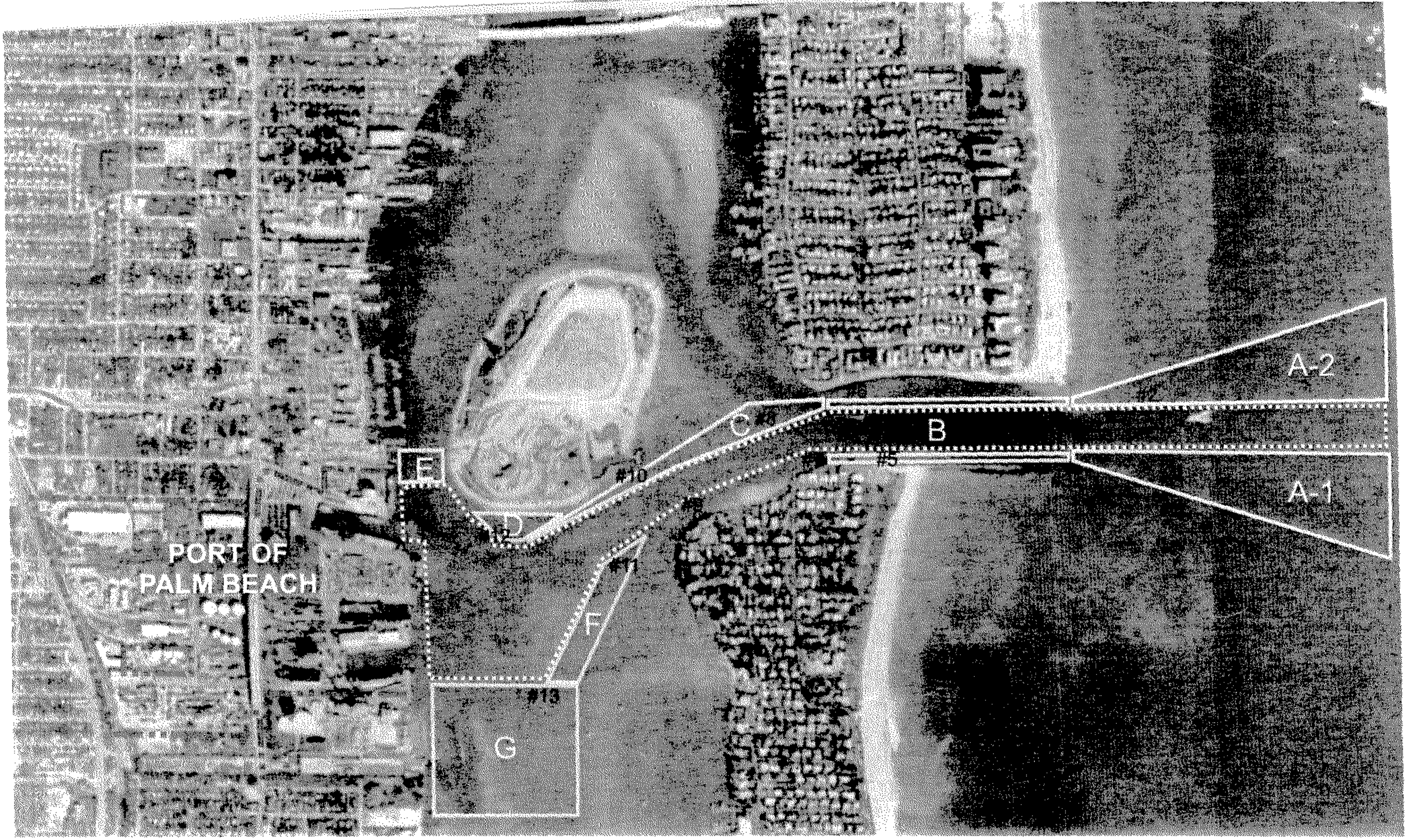
Richard E. Walesky

Richard E. Walesky, Director
Environmental Resources Management

REW:PD:dab

Enclosure

c: (w/ enclosure):
Robert Weisman, County Administrator
Members of the PBC Artificial Reef and Environmental Enhancement Committee
Lori Baer, Director, Port of Palm Beach
Peter Elwell, Town Manager, Town of Palm Beach
Cynthia Lindscoog, Town Administrator, Town of Palm Beach Shores
William Wilkins, City Manager, Riviera Beach
Edward Mitchell, City Administrator, West Palm Beach
Dennis Eshleman, Director, PBC Parks and Recreation
David Roach, Executive Director, FIND



LEGEND

- - - Federal Harbor Project

Potential Improvement Areas

Note: Improvement areas are general study areas only; extensive analysis is required prior to refinement and selection of any expansion alternative.

A-1 - South Channel Flare
A-2 - North Channel Flare
B - Widener inside jetties
C - Widener
D - Peanut Island Widener
E - North Basin Widener
F - Turning Basin Eastern Widener
G - Turning Basin Southern Expansion
1- Channel Marker Number

Palm Beach Harbor/Lake Worth Inlet
Navigation Feasibility Study
Study Areas for Potential Improvements
Port of Palm Beach District

Source: Google Earth; The Four Gates Company, 2007

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Cris
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

January 23, 2008

Ms. Catherine L. Brooks
Jacksonville District, Planning Division
U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers - Scoping Notice Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor) - Palm Beach County, Florida.
SAI # FL200712103896C

Dear Ms. Brooks:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the above public notice.

The Florida Department of Environmental Protection's (DEP) Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers the following comments:

1) Please be advised that there is an existing sand transfer plant at the inlet. In 1996, the pipe was drilled approximately 15 feet under the existing channel. The costs of redrilling the pipe should be included in the total project costs if the proposed entrance channel depth approaches this pipeline depth.

2) The DEP will consider the effects of dredged material disposal and management on Peanut Island and other upland sites. Any potential discharges from the disposal site (i.e., return water) must be reviewed, along with any construction to increase the capacity of the containment dikes. (If no dike construction is necessary, an engineer's certification of containment dike integrity will still be required.) Impacts of disposal operations on water-dependent bird species must be considered, especially if conducted during nesting season.

3) Continuous seagrass beds border the south turning basin, and seagrasses have also been observed around the south end of Peanut Island. Any expansion within the areas labeled C, D, F and G on Figure 1 of the scoping notice will likely require seagrass mitigation.

4) A Florida Power & Light (FP&L) power plant exists south of the port. Expansion to the south would bring larger ships closer to this warm-water manatee refuge, increasing the risk of primary and secondary impacts.

5) Neither the Lake Worth Inlet Management Plan study by Applied Technology and Management, Inc. (April 1995) nor prior studies by the Jacksonville District Corps of Engineers have obtained any recent inlet hydraulics data, so DEP does not have a complete understanding of this inlet's hydraulics. Changes to the federal navigation project through this inlet propose channel deepening and widening that would affect the inlet's hydraulics. Water quality effects, tidal prismatic modification, and changes to interior waters circulation are among the physical environmental reasons to develop an understanding of the inlet's hydraulics. Physical changes to the inlet's hydraulics may also have biological effects.

   The effect of channel deepening and widening on the sand transfer plant's discharge line and pumping performance should also be evaluated. Although the inlet trap northeast of the inlet should entrap most of the sediment, it is too early to ascertain its success or calculate the amount of sediment that will still be entrapped by the inlet channel. At most other inlets in Florida, channel deepening would have a significant impact on natural sand bypassing.

   DEP staff requests the collection of current inlet hydraulics data to utilize in the evaluation of any proposed modifications.

Continued coordination with the DEP Bureau of Beaches and Coastal Systems and Florida Fish and Wildlife Conservation Commission to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.

The Florida Fish and Wildlife Conservation Commission (FWC) has provided a number of comments regarding the potential direct and secondary impacts of:

1) Beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings;
2) Turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the FP&L Riviera Beach power plant south of the port;

3) Dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrasses, corals and hardbottom resources; and
4) Peanut Island dredged material placement on wildlife habitat.

FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.

Based on the information contained in the scoping notice and the enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The concerns identified by our reviewing agencies must be addressed, however, prior to project implementation. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews. The state's final review of the project's consistency with the FCMP will be conducted during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

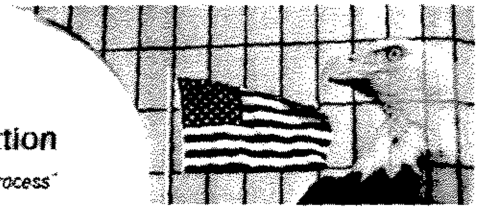
cc: Roxane Dow, DEP, BBCS
Mary Ann Poole, FWC

MyFlorida.com

Florida

Department of Environmental Protection

"More Protection, Less Process"



Categories

Project Information	
Project:	FL200712103896C
Comments Due:	01/11/2008
Letter Due:	01/21/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - SCOPING NOTICE - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EXPANSION OF LAKE WORTH INLET (PALM BEACH HARBOR) - PALM BEACH COUNTY, FLORIDA.
Keywords:	ACOE - SCOPING - EXPAND LAKE WORTH INLET/PALM BEACH HARBOR - PALM BEACH CO.
CFDA #:	12.107

Agency Comments:

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL
The proposed study is not in conflict or inconsistent with the Strategic Regional Policy Plan. It furthers Regional Goal 7.1 that calls for a balanced and integrated transportation system.
PALM BEACH -
COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS
FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
The FWC has provided a number of comments regarding the potential direct and secondary impacts of: 1) beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings; 2) turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the Florida Power & Light Riviera Beach power plant south of the port; 3) dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrass, corals and hardbottom resources; and 4) Peanut Island dredged material placement on wildlife habitat. FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.
STATE - FLORIDA DEPARTMENT OF STATE
No Comments Received
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
The DEP Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers comments on the potential effects of the project on: the existing sand transfer plant at the inlet, Peanut Island and other proposed upland disposal sites, seagrass beds around Peanut Island, the FP&L plant warm-water manatee refuge and current inlet hydraulics. Continued coordination with the DEP Bureau of Beaches and Coastal Systems and FWC to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.
SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Released Without Comment

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto Chair *Miami*
Brian S. Yablonski Vice-Chair *Tallahassee*
Kathy Barco *Jacksonville*
Ronald M. Bergeron *Fort Lauderdale*
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Dwight Stephenson *Delray Beach*
Kenneth W. Wright *Winter Park*

Executive Staff
Kenneth D. Haddad Executive Director
Victor J. Heller Assistant Executive Director
Karen Ventimiglia Deputy Chief of Staff

Office of Policy and Stakeholder Coordination
Mary Ann Poole Director
(850) 410-5272
(850) 922-5679 FAX

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Hearing/speech impaired:
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(800) 955-8770 (V)
MyFWC.com

January 10, 2008

RECEIVED
JAN 14 2008
OIP / OLGA

Ms. Lauren Milligan
Florida Department of Environmental Protection
Florida State Clearinghouse
3900 Commonwealth Boulevard, MS-47
Tallahassee, FL 32399-3000

Re: Palm Beach County, SAI #FL200712103896C, Notice of Intent to prepare a Draft Environmental Impact Statement for expansion of Lake Worth Inlet (Palm Beach Harbor) including widening and deepening of the existing channels and turning basin

Dear Ms. Milligan:

The Florida Fish and Wildlife Conservation Commission's (FWC) Aquatic Habitat Conservation and Restoration Section has coordinated a preliminary agency review of the potential wildlife and wildlife habitat issues associated with the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida. This letter outlines the anticipated concerns and comments related to the feasibility study and proposed Draft Environmental Impact Statement.

Background

The U.S. Army Corps of Engineers (USACE) is performing a feasibility study for the expansion of Lake Worth Inlet (Palm Beach Harbor). The expansion alternatives being reviewed include no action, creation of channel flares, channel deepening and widening, and turning basin expansion. Options for the disposal of dredged material include Peanut Island, disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site, beach placement, disposal of suitable rock at existing artificial reef sites, and any other viable disposal options that may become available. The USACE intends to prepare a Draft Environmental Impact Statement for this project. The Port of Palm Beach District is the cooperating agency and non-federal sponsor for this project and will provide information and assistance on the resource assessment and mitigation measures and alternatives.

Wildlife

Marine Turtles: The coastal beaches both north and south of Lake Worth Inlet provide nesting habitat for the loggerhead (*Caretta caretta* - threatened), leatherback (*Dermochelys coriacea* - endangered), and the green sea turtle (*Chelonia mydas* - endangered). Construction activities associated with sand placement on these beaches during the marine turtle nesting season (March 1 through October 31) could adversely affect nesting turtles, incubating nests, and emergent hatchlings. The compatibility of sand placed on the nesting beach may also adversely affect the ability of nesting females to construct viable nests and the incubation environment necessary for successful development and escape of marine turtle hatchlings.

Nearshore hardbottom communities and artificial reefs provide foraging, resting and juvenile developmental habitat that could be adversely affected by the expansion of channels associated with this project. Blasting to remove limestone during deepening or widening of channels could be lethal to marine turtles and manatees if it occurs relatively close to individual animals.

Manatees: The Florida Power & Light Riviera Beach power plant located immediately south of the port provides an important winter warm-water refuge for the Florida manatee (*Trichechus manatus latirostris* - endangered). During winter cold fronts, over 400 manatees have been documented using this warm-water refuge. The desired turning basin expansion would encompass the area adjoining this warm-water habitat. Construction activities may directly affect manatees using this site if work is conducted during the cold season (November 15 through March 31), or indirectly by creating a deterrence to the use of this important habitat.

Secondary adverse affects could include altering the nature of the warm-water refuge. Substantially deepening the bathymetry adjacent to the warm-water refuge could result in reduction of warm-water habitat due to an increase of the mixing between the cooler water from the expanded turning basin with the thermal outfall of the power plant. Expansion of the turning basin is also expected to affect seagrass resources that provide forage for manatees. Increased shipping traffic may also increase the risk to manatees due to its proximity to the warm-water refuge and to the travel corridors used to access foraging areas located north of the port.

Habitat

Corals and Hardbottom: Hard corals may be found within the inlet channel and the area marked as "south channel flare" and "north channel flare" on the map provided by the USACE labeled "Study Areas for Potential Improvements (Widening and Deepening)." In addition, the nearshore areas that may be affected by this project fall within the range of staghorn coral (*Acropora cervicornis*), which was recently listed federally as a threatened species. Other hardbottom resources occur on the walls of the existing channel and potentially in the nearshore channel expansion areas. The primary benthic resources expected to be found within the prospective expansion areas include live bottom (soft corals and sponges), solution holes, limestone ledges, and their associated communities.

Potential adverse effects to these benthic resources could result due to dredging, blasting, and sediment disposal. Expansion of the offshore disposal area may also affect hardbottom resources, which will need to be considered if this option is explored.

Seagrass: Six species of seagrass have been documented in Lake Worth Lagoon and all could be affected by the dredging necessary to expand the inlet channel and turning basin. Seagrass species found in Lake Worth Lagoon include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*) and the threatened species Johnson's seagrass (*Halophila johnsonii*). Seagrasses provide important ecological functions to estuarine and marine coastal systems. A wide range of organisms are directly or indirectly dependent upon seagrasses for food and habitat (Zieman and Zieman1989), including several federally and state-listed endangered species such as green sea turtle and Florida manatee.

Seagrasses, coral, and hardbottom also provide essential fisheries habitat by creating a physically stable refuge and nursery ground for numerous commercially and recreationally viable fish and invertebrates (Zieman 1982, Phillips and Meñez 1988, Fonseca et al. 1988).

Artificial Reefs

Any dredged material that would be considered for disposal at an artificial reef site will need to meet appropriate criteria for artificial reef construction depending upon the proposed deployment location and material types. No silt, sand, clay (of any type), or rock boulders less than 150 pounds each will be allowed to be deployed in the artificial reef site. Ideally, the minimum acceptable weight of each individual piece of rock proposed for artificial reef deployment should weigh at least 500 pounds. Close coordination with the FWC Artificial Reef Program (Attn: Jon Dodrill, FWC-Division of Marine Fisheries Management) and Palm Beach County Artificial Reef Coordinator (Dr. Janet Phipps) will be required if artificial reefing is considered as a disposal option.

Peanut Island

Peanut Island contains a large habitat enhancement project that includes a 7.1-acre maritime hammock, 3 acres of mangroves, 1.5 acres of tidal channels and ponds, 3 acres of shallow-water lagoons and 1.3 acres of shallow-water reef. All of these habitat features provide habitat for a variety of wildlife including shorebirds, fish, crustaceans, and mollusks. Placing spoil on the island and widening the channel in segments C, D and E could adversely affect these habitats.

Resource Surveys

We recommend that multiple resource surveys be conducted as well as a review of historical data in order to evaluate the potential affects of this project on the wildlife and marine habitats that are present within the scope of the project. The draft Environmental Impact Statement should include the results of seagrass surveys within the project boundary areas of Lake Worth Lagoon and the inlet, as well as the results of surveys of hardbottom and coral surveys within the inlet channel and the inlet flares, with special attention paid to the finding of any staghorn coral. We offer our expertise and assistance in developing the protocols for the resource surveys due to their importance in the determination process of the feasibility of the options suggested in this scoping effort.

Summary

Expansion of the Lake Worth inlet channel and turning basin has the potential to adversely affect numerous wildlife and habitat resources of the state of Florida. Many difficult environmental hurdles would need to be overcome for the full extent of this project to come to fruition. We recommend that the USACE and the Port of Palm Beach give great consideration to the natural resources that would be affected

USDA

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

Plant Protection
and Quarantine

One East 11th St.,
Suite 332, Box 3
Riviera Beach, FL
33404

Phone: (561) 841-4873
Fax: (561) 841-4871

Federal Relay Service
(Voice/TTY/ASCII/Spanish)
1-800-877-8339

December 12, 2007

Ms. Catherine L. Brooks
U.S. Army Corps of Engineers
Jacksonville District
Planning Division, Environmental Section
P.O. Box 4970
Jacksonville, FL 32207

Dear Ms. Brooks:

We recently received a package from Marie Burns, Acting Chief, Planning Division, regarding the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida (page 1 enclosed).

Our address on the envelope and Port of Palm Beach Mailing List (November 2007) is incorrect. Please make the following change to our address which appeared on page 12 of the mailing list (copy enclosed):

OLD ADDRESS:	US DEPT OF AGRICULTURE THE MARITIME OFFICE BLDG 4 EAST PROT ROAD SUITE 112 RIVIERA BBEACH FL 33404
NEW ADDRESS:	**US DEPT OF AGRICULTURE MARITIME OFFICE BLDG 1 EAST 11TH ST., STE 332, BOX 3 RIVIERA BEACH FL 33404**

If you have any questions concerning this matter, call me at 561-841-4873. Thank you.

Sincerely,

John Gilmore

John Gilmore
Supervisory PPQ Officer
USDA, APHIS, PPQ

Enclosures:
1. Ltr from Corp dtd 12/06/07
2. Pg 12 of Address List w/correction

Sondra Mack
958 North Lake Way
Palm Beach, FL 33480

December 11, 2007

Ms. C. L. Brooks
Planning Division
Department of the Army
Jacksonville District Corps of Engineers
PO Box 4970
Jacksonville, FL 32232-0019

Dear Ms. Brooks:

I am in receipt of the letter from Acting Chief Marie Burns regarding the expansion of Lake Work Inlet. I think it's a great idea. Whatever we can do to help the inlet and beaches will benefit everyone.

Yours truly,

Sondra Mack

Sondra Mack

SM:jl

Surfrider Foundation
CONSERVATION • ACTIVISM • RESEARCH • EDUCATION
P.O. BOX 6010
SAN CLEMENTE, CA 92674-6010

WEST PALM BEACH
FL 334
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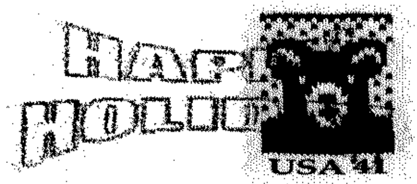

General Grosskruger
US Army Corps of Engineers, Jacksonville District
701 San Marco Boulevard
Jacksonville, FL
32207-0019

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32207+8175

RECEIVED
2 Jan 08

Marie Burns
Planning Division
Dept of the Army

December 23, 2007

Re: Expansion of Lake Worth Inlet

Dear Ms. Burns:

I have received your letter dated Dec 6, 2007 about the possible expansion of Lake Worth Inlet.

Our property is located in the 'C' section or Northwest part of Palm Beach Island. Over the years of the inlet dredging we have lost as much as 50 feet of our property and beach. We do not want anymore dredging to go on because we have lost too much property already. Please do NOT dredge in the 'C' area.

We would appreciate it if you would put back the beaches that were on the Northwest portion of Palm Beach Island. They have been taken away by prior dredgings and hurricane conditions.

If you have any questions or comments please let me know.

Sincerely,

Jeffrey P. Prudden

Jeffrey P. Prudden

PURPOSE: SCOPING MEETING - Environmental Impact Statement for Palm Beach Harbor, Feasibility Study of Navigation Improvements
DATE: 9 January 2008
LOCATION: Riviera Beach, FLORIDA (Port of Palm Beach)

Kelly Novic, Staff Biologist
NAME AND TITLE (PLEASE PRINT)

Save the Manatee Club
BUSINESS OR ORGANIZATION YOU REPRESENT

500 N Maitland Ave
MAILING ADDRESS

Maitland, FL 32751
CITY, STATE, ZIP CODE

knovic@savethemanatee.org
EMAIL ADDRESS

Mail Your Comments to:

U.S. Army Corps of Engineers
Attention: PD-EC
P.O. Box 4970
Jacksonville, Florida 32202-4412

YOUR COMMENTS OR NOTES BELOW:

SMC would like to express our concerns over the impacts this project will have on manatees and their food source. Historical, current, and projected manatee use needs to be examined and considered. Please review FWRI manatee sighting and telemetry data. Holly Edwards at FWRI may be able to assist with this data aquisition (727-896-8626).

Please also coordinate with the FWS regarding Mike Runge's findings for the east coast in 2003 and 2007. Runge's Study is available through USFWS (Jim Valade is contact: 904-232-2580).

Runge's model predicts a stable to slightly increasing current manatee population that is projected to decline on the East Coast in the next 10 to 15 years. Warm water refuges like FPL Riviera Beach are critical.

SMC will be monitoring the development of this plan and would like to see negative impacts to manatees, their habitats, and their food sources avoided.

PRIVACY ACT STATEMENT

AUTHORITY: 42 USC 4321, 4331-4335
PRINCIPAL PURPOSES: Information on this card is used for organization and conduct of this meeting. It may be added to the mailing list for notification of future meetings on the topic and for addressing correspondence subsequent to the meeting.
ROUTINE USES: This information is a public record and may be disclosed to other Federal or local agencies for governmental purposes as well as to private individuals and organizations under the Freedom of Information Act.
MANDATORY OR VOLUNTARY DISCLOSURE: Completion of this card is voluntary. However, failure to supply the information requested may result in your (or your agency's) omission from further notification regarding participation in the process.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JAN 23 2008

To Participants and Attendees:

Thank you for your attendance and participation in the Public Scoping Meeting held on January 9, 2008, to explore expansion alternatives for Lake Worth Inlet – Palm Beach Harbor, Palm Beach County, Florida. As discussed during the scoping meeting, the "scoping process" is used to determine the breadth of issues that should be considered during preparation of the Draft Environmental Impact Statement (DEIS), as required by the National Environmental Policy Act and associated regulations (40 CFR 1501.7).

The January 9th scoping meeting produced a broad range of views and issues with noteworthy potential for analysis under the DEIS evaluation process. The information obtained from the public meeting has been incorporated into the administrative record, in the form of a recorded transcript and written submittals. You may obtain a copy of the recorded meeting (i.e., transcript or written submittals), after February 1, 2008 from website: http://planning.saj.usace.army.mil/envdocs/envdocsb.htm#Palm-Beach-County under Palm Beach County, Lake Worth Inlet (Palm Beach Harbor), Florida. Please note this website will not contain information that is already publicly available or copyrighted. If you have any additional information that you would like to see incorporated into the DEIS and the information is relevant to the proposal, please submit to the Chief, Planning Division, at the above letterhead address within 15-days from the date of this letter.

Please be advised that your name and mailing information have been made part of the project's mailing list. Unless you indicate otherwise, this list will be used to inform when the DEIS is available for public review and comment in addition to providing notice for the public meeting to be scheduled on the DEIS.

I would like to thank you for taking the time to attend the scoping meeting and providing input into this process.

Sincerely,

for

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Acting Chief, Planning Division

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Lake Worth Inlet, Palm Beach Harbor

Endangered Species Act
Correspondence

Planning Division
Environmental Branch

JUN 2 6 2012

Mr. Larry Williams, Field Supervisor
South Florida Field Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Williams:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment for the Lake Worth Inlet widening and deepening, addressing the concerns of the Florida manatee (*Trichecus manatus*) which is under the purview of the U.S. Fish and Wildlife Service (FWS). Based on the enclosed Biological Assessment, the U.S. Army Corps of Engineers has determined that the proposed action may affect, not likely to adversely affect, the Florida manatee. The Corps also has determined that the proposed project will not adversely affect designated critical habitat for the Florida manatee. The Corps requests that the FWS concur with the determination regarding this species.

The USACE has determined that consultation of nesting sea turtles is covered under the Statewide Programmatic Biological Opinion (SPBO) and will not be discussed in the enclosed Biological Assessment. This letter also constitutes the notification required under the SPBO for placement of material on or near the shoreline as described on the enclosed form.

If you have any questions or need further information, please contact Mr. Pat Griffin at 904-232-2286, email Patrick.M.Griffin@usace.army.mil

Sincerely,

Kenneth R Dugger
Eric P. Summa
Chief, Environmental Branch

Enclosure

PROJECT INFORMATION SHEET
Programmatic Biological Opinion (PBO)
Beach Placement and Shore Protection
Coast of Florida
U.S. Fish and Wildlife Service (FWS)

Prepared by: Pat Griffin

Date: Jun 26, 2012

Project Name: Lake Worth Inlet Widening and Deepening

Project Number: 131356

Application #:

Sponsor / Applicant: Port of Palm Beach

Quantity, Length: total dredge quantites estimated at 1.4 million yards, 250 thousand will be beach quality and go on the beach already covered under the palm beach O&M project.

County(ies) Palm Beach

Location, R-Monuments: R76-R79

Latitude: ° ' "   Longitude: - ° ' "

Borrow or Dredge Site(s): Lake worth entrance channel and turning basin

Beach Placement from Navigation Dredging: ☐ O&M ☒ Deepen, Widen, or Expand

Beach Nourishment / Shore Protection Project: ☐ Initial Nourishment ☐ Renourishment

Nature of Activity: ☒ Beach Placement ☒ Beach Placement Below Mean Low Water

☐ Dune Placement / Planting ☒ Nearshore Placement (all material remains below mean low water)

☐ Sand Bypassing ☐ Sand Back-passing ☐ Sand Transfer ☐ Groin Repair/Replace

☐ Jetty Repair/Replace ☐ *Other (list in comment box)

Area with Sea Turtle Window: ☒ SE FL (Broward through Brevard Counties) ☐ Sarasota Co (Manasota Key)

☐ Gulf Co (St Joe Peninsula St Pk, St. Joe Peninsula, Cape San Blas) ☐ Franklin Co (St. George Is)

*Piping Plover Critical Habitat (below) ☒ *Other Piping Plover Habitat ☐ *30-day Coordination with FWS Still Pending

1.

2.

Beach Mouse Habitat (use drop-down box below): ☐ Other Beach Mouse Habitat (list in comment box)

☒ *Important Manatee Area ☐ *Beach Jacquemontia Habitat (including pipeline/access, storage/staging areas)

☐ *Roseate Tern Nesting Colony, May-June (Pelican Shoal, Vaca Rock, Truman Annex, Marathon Gov Center)

Responsible for Post Construction Monitoring and Corrective Measures:

Sponsor (condition of DEP or Corps Permit issued to Sponsor)

Comment (1): Piping plover other habitat. Within 1 mile of inlet with beach placement

Comment (2):

* These items may be outside the scope of the PBO and/or require additional coordination/consultation with FWS.

Biological Assessment to
U.S. Fish and Wildlife Service for
Lake Worth Inlet Widening and Deepening
Palm Beach County, Florida

Description of the Project Area – Palm Beach Harbor is on the Atlantic coast of Florida, approximately 53 miles south of Fort Pierce Harbor, and 71 miles north of Miami Harbor. The harbor entrance (also known as Lake Worth Inlet) is an artificial cut through the barrier beach and limestone formation connecting Lake Worth, a coastal lagoon, with the Atlantic Ocean. Communities bordering Palm Beach Harbor are Palm Beach Shores on the barrier beach to the north, Riviera Beach on the west shore of Lake Worth, and the town of Palm Beach to the south. West Palm Beach is located immediately south of Riviera Beach and is the largest community in the area. Lake Worth Inlet is a federally maintained inlet and deepwater port located on the Atlantic Ocean in Palm Beach County, Florida.

Lake Worth is an estuary that exhibits characteristics typical of estuarine systems in southeast Florida. Much of the beach and dune ecosystem in this vicinity has been altered by development. Structures such as seawalls and bulkheads have reduced a significant amount of the vegetation that would naturally occur here (Applied Technology and Management Inc. 1995).

The existing channel sediments in the Inlet are predominantly sand and shell and are subject to considerable shifting by wave and tidal action. Limestone rock outcrops are found on either side of the Federal channel at the interface between the Inlet channel and the Intracoastal Waterway (IWW). Littoral drift in the area is predominantly north to south. The mean tidal range is 2.8 feet and the spring tidal range is 3.3 feet. Shoaling continues to be a recurring problem in Palm Beach Harbor.

A sand transfer plant is located on the north jetty of the inlet. The sand transfer plant takes the sand that accumulates on the north jetty, slurries the material with sea water, and passes it under the inlet and to the beach south of the south jetty. Sand continues to accumulate at a rapid rate in this area. The areas to be dredged are located within the Federal project limits.

Action Area

The project proposes to widen and deepen Lake Worth Inlet navigation channel (Figure 1). The authorized project depths are as follows: entrance channel to a depth of 37 feet (from STA 30+00 to STA 47+00); from the inner channel to a depth of 33 feet; from the turning basin to a depth of 33 feet; and to a depth of 25 feet in the extended turning basin located north of the existing project basin. The existing settling basin and the extended settling basin are maintained at 35 feet and are located adjacent to the entrance channel and north jetty.

Deepening will occur within the entrance channel from the current 37 feet to 47 feet, with depths within the turning basin increasing from 33 feet to 43 feet deep. Widening is needed in certain areas of the project for safe navigation of larger vessels. The entrance channel requires a flare to the south as prevailing currents cause navigation hazards entering the channel as currently configured. The flare starts at the south jetty and extends approximately 2500 feet to the southeast. Within the entrance channel, the northern channel wall would be widened by 60 feet from the north jetty to the beginning of the turn to the southwest. At the turn, the northern side of the channel would be widened 150 feet to ensure a 400 foot channel width throughout. The area at the southern edge of Peanut Island would be deepened to 43 feet. Finally, the southern edge of the turning basin would be widened 150 feet to the south.

Based on geotechnical boring data from the entrance channel and turning basin, sand and rock of varying hardness are expected to be encountered during widening and deepening. Sand, soft rock and rock fragments will be removed via traditional dredging methods. Where hard rock is encountered, the Corps anticipates that contractors could utilize other methods, including confined blasting or large cutterhead dredge equipment to pre-treat the rock prior to removal. Dredged material would be deposited at up to four locations. All beach quality sand material shall be placed on the existing beach disposal template just south of the inlet (figure 2). Sandy material not considered beach quality under the existing permit will be placed in the authorized nearshore placement site south of the inlet. Other rock/coarse materials would likely be placed in a previously dredged depression within Lake Worth as part of construction to create seagrass habitat as compensatory mitigation for seagrass impacts. Dredged rock and other materials that cannot be beneficially utilized for mitigation may be transported to the Ocean Dredged Materials Disposal Site (ODMDS) or placed in a permitted, upland disposal site on Peanut Island.

Figure 1: Current project and proposed changes in yellow

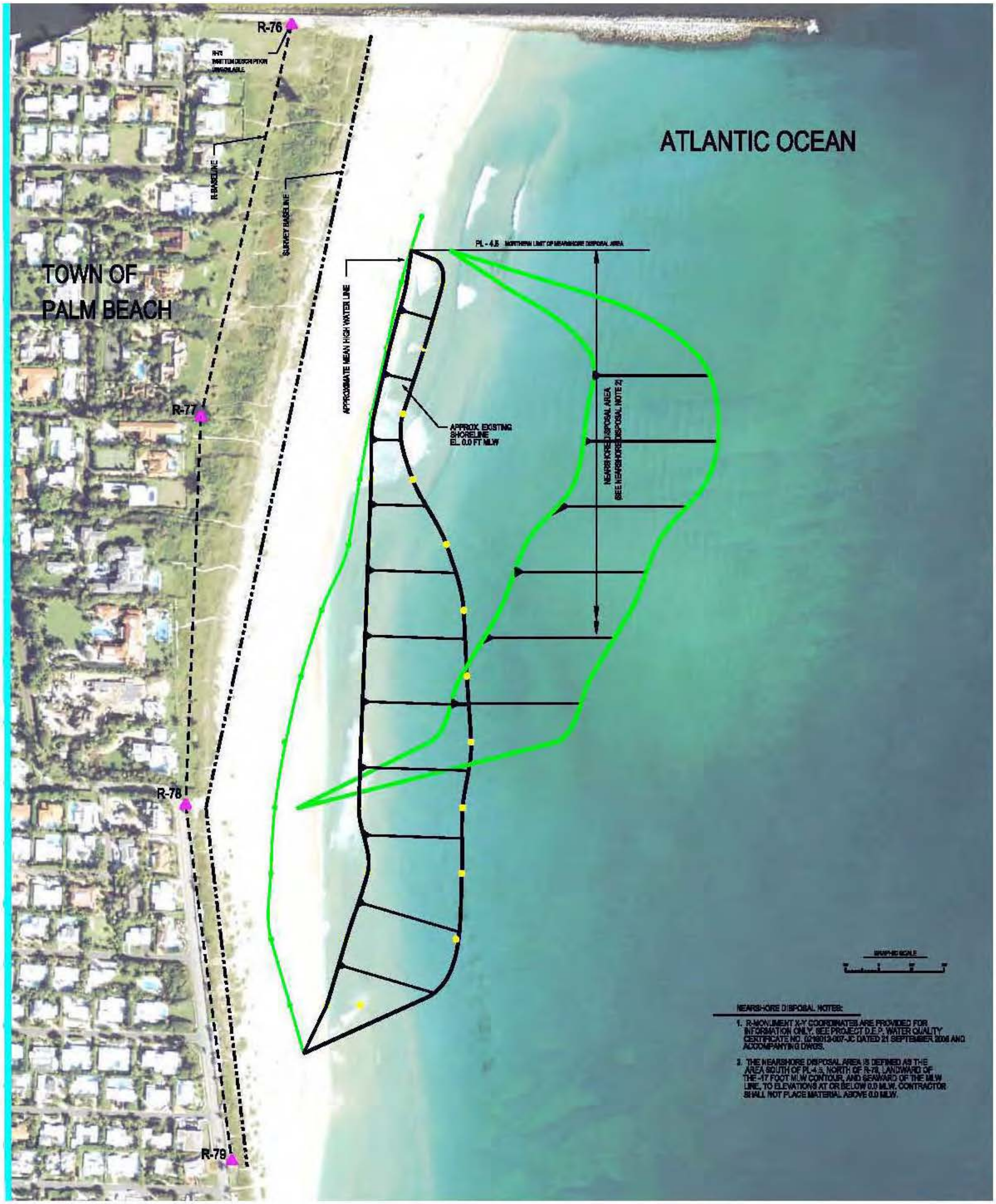

Figure 2. Beach placement site south of inlet

Protected Species Included in this Assessment

Of the listed and protected species under U.S. Fish and Wildlife Service (FWS) jurisdiction occurring in the action area, the Corps believes that the Florida manatee (*Trichecus manatus*) occurs with the project area. The USACE has determined that consultation of nesting sea turtles is covered under the Statewide Programmatic Biological Opinion (SPBO) and will not be discussed in this Biological Assessment.

The Federal government has recognized the threats to the continued existence of the Florida manatee, a subspecies of the West Indian manatee, for more than 30 years. The West Indian manatee was first listed as an endangered species in 1967 under the Endangered Species Preservation Act of 1966 (16 U.S.C. 668aa(c)) (32 FR 48:4001). The Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa(c)) continued to recognize the West Indian manatee as an endangered species (35 FR 16047), and the West Indian manatee was also among the original species listed as endangered pursuant to the Endangered Species Act of 1973. Critical habitat was designated for the manatee in 1976, and includes the project area (50 CFR 17.95). The justification for listing as endangered included impacts to the population from harvesting for flesh, oil, and skins as well as for sport, loss of coastal feeding grounds from siltation, and the volume of injuries and deaths resulting from collisions with the keels and propellers of powerboats. Manatees are also protected under the provisions of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq*.) and have been protected by Florida law since 1892. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary and providing signage and speed zones in Florida's waterways.

Species and Suitable Habitat Descriptions

Florida Manatee *(Trichecus manatus)*

All manatees belong to the order Sirenia. The living sirenians consist of one species of dugong and three species of manatee. A fifth species, the Steller's sea cow, was hunted to extinction by 1768. All living sirenians are found in warm tropical and subtropical waters. The West Indian manatee was once abundant throughout the tropical and subtropical western North and South Atlantic and Caribbean waters. The Florida manatee occurs throughout the southeastern United States. However, the only year-round populations of manatees occur throughout the coastal and inland waterways of peninsular Florida and Georgia (Hartman, 1974). During the summer months, manatees may range as far north along the East Coast of the U.S. as Rhode Island, west to Texas, and, rarely, east to the Bahamas (FWS, 1996, Lefebvre et al., 1989). There are reports of occasional manatee sightings from Louisiana, southeastern Texas, and the Rio Grande River mouth (Gunter, 1941, Lowery,1974).

Preferred Habitats

Manatees occur in fresh, brackish, and salt water and move freely between environments of salinity extremes. They inhabit rivers, bays, canals, estuaries, and coastal areas that provide seagrasses and macroalgae. Freshwater sources, either natural or human-influenced/created, are especially important for manatees that spend time in estuarine and brackish waters (FWS, 1996). Because they prefer water above 70 ºF (21 ºC), they depend on areas with access to natural springs or water effluents warmed by human activities, particularly in areas outside their native range.

Manatees often seek out quiet areas in canals, lagoons or rivers. These areas provide habitat not only for feeding, but also for resting, cavorting, mating, and calving. Manatees may be found in any waterway over 3.3 ft. (1 m) deep and connected to the coast. Deeper inshore channels and nearshore zones are often used as migratory routes (Kinnaird, 1983). Although there are reports of manatees in locations as far offshore as the Dry Tortugas Islands, approximately 50 mi. (81 km) west of Key West, Florida, manatees rarely venture into deep ocean waters.

Habits

Manatees use secluded canals, creeks, embayments, and lagoons for resting, cavorting, mating, calving and nurturing their young; and open waterways and channels as travel corridors. Within marine, estuarine, and freshwater habitats they are found in turbid and clear water in depths of at least 3 ft. In coastal areas, they tend to travel in water up to 20 ft deep. Manatees occupy different habitats during various times of the year, with a focus on warm-water sites during winter.

Florida manatees are herbivores that feed opportunistically on a wide variety of submerged, floating and emergent vegetation. Shallow grass beds with ready access to deep channels are the preferred feeding areas in coastal and riverine habitats. A complete review of manatee biology is included in the manatee section of the South Florida Multi-species Recovery Plan (FWS, 1999).

In general, manatees feed primarily on freshwater plants, submerged sea grasses, and plants along shorelines.

Migration Patterns

The overall geographic distribution of manatees within Florida has changed since the 1950s and 60s (Lefebvre et al., 1989), and prominent shifts in seasonal distribution are also evident. Specifically, the introduction of power plants and paper mills in Texas, Louisiana, southern Georgia, and northern Florida has given manatees the opportunity to expand their winter range to areas not previously frequented (Hartman, 1979). Florida manatees move into warmer waters when the water temperature drops below about 68 ºF (20 ºC). Before warm effluents from power plants became available in the early 1950s, the winter range of the manatee in Florida was most likely limited on its northern bounds by the Sebastian River on the east coast and Charlotte Harbor on the west coast (Moore, 1951). Since that time, manatees altered their normal migration patterns, and appreciable numbers of manatees began aggregating at new sites. As new power plants became operational, more and more manatees began taking advantage of the sites even though it required traveling great distances. Among the most important of the warm-water discharges are the Florida Power and Light Company's power plants at Cape Canaveral, Fort Lauderdale, Port Everglades, Riviera Beach, and Fort Myers, and the Tampa Electric Company's Apollo Beach power plant in Tampa Bay. During cold weather, more than 200 manatees have been reported at some power plants. These anthropogenically heated aquatic habitats have allowed manatees to remain north of their historic wintering grounds. Although seemingly conducive for survival, warm-water industrial discharges alone cannot furnish suitable habitats for manatees, as they may not be associated with forage that is typically found near natural warm-water refugia of natural springs.

Population Trends

Determining exact population estimates or trends is difficult for this species. The best indicator of population trends is derived from mortality data and aerial surveys (Ackerman et al., 1992, Ackerman et al., 1995, Lefebvre et al., 1995). Increases in the number of recovered dead manatees have been interpreted as evidence of increasing mortality rates (Ackerman et al., 1992, Ackerman et al., 1995). Because manatees have low reproductive rates, these increases in mortality may lead to a decline in the population (O'Shea et al., 1992 and Beeler and O'Shea, 1988). Aerial surveys, which represent the minimum number of manatees in Florida waters (not the total population size), have been conducted for more than 20 years, and may indicate population growth. However, because survey methods were inconsistent, conclusions are tentative. O'Shea (1988) found no firm evidence of a decrease or increase between the 1970s and 1980s, even though aerial survey counts increased. Over the last decade, aerial counts have varied from 1,267 (in 1991) to 3,807 (in 2012) (FMRI, 2012). The mean number observed during all counts (January, February, and/or March of all years since 1991 except 2008) is 2,332 (std dev = 672).

Boat traffic and development are the main causes for decline in the population. Other causes of injury or death include ingestion of debris, entanglement in fishing gear, cold stress, red tide, and entrapment or crushing in water control structures and navigational locks (USFWS, 2001). Even though manatees are vulnerable in their current environment, recent surveys have shown increases in three of the four population stocks. A 5-year review prepared by USFWS concluded that the manatee no longer fits the ESA definition of endangered and made a recommendation to reclassify it as threatened (USFWS, 2007).

Mortality

Human activities have likely affected manatees by eliminating or modifying suitable habitat; causing alteration of, or limiting access to historic migratory routes; and killing or injuring individuals through incidental or negligent activities. To understand manatee mortality trends in Florida, Ackerman et al. (1995) evaluated the number of recovered carcasses between 1974 and 1992 and categorized the causes of death. The number of manatees killed in collisions with watercraft increased each year by 9.3%. The number of manatees killed in collisions with watercraft each year correlated with the total number of pleasure and commercial watercraft registered in Florida (Ackerman et al., 1995). Other deaths or injuries were incurred due to flood-control structures and navigational locks, entanglement in fishing line, entrapment in culverts, and poaching, which together accounted for 162 known mortalities between 1974 and 1993 (FMRI, 2002a).

Table 1: Manatee deaths in Florida (statewide) from 1974 through 2011(source: FMRI)

Year	Water-craft	Flood Gate / Canal Lock	Other Human	Perinatal	Cold Stress	Natural	Undetermined	Unrecovered	Total
1974	3	0	2	0	0	0	2	0	7
1975	6	1	1	7	0	1	10	3	29
1976	10	4	0	14	0	2	22	10	62
1977	13	6	5	9	0	1	64	16	114
1978	21	9	1	10	0	3	34	6	84
1979	24	8	9	9	0	4	18	5	77
1980	16	8	2	13	0	5	15	4	63
1981	24	2	4	13	0	9	62	2	116
1982	20	3	1	14	0	41	29	6	114
1983	15	7	5	18	0	6	28	2	81
1984	34	3	1	25	0	24	40	1	128
1985	33	3	3	23	0	19	32	6	119
1986	33	3	1	27	12	1	39	6	122
1987	39	5	2	30	6	10	22	0	114
1988	43	7	4	30	9	15	23	2	133
1989	50	3	5	38	14	18	39	1	168
1990	47	3	4	44	46	21	40	1	206

1991	53	9	6	53	1	13	39	0	174
1992	38	5	6	48	0	20	45	1	163
1993	35	5	6	39	2	22	34	2	145
1994	49	16	5	46	4	33	37	3	193
1995	42	8	5	56	0	35	53	2	201
1996	60	10	0	61	17	101	154	12	415
1997	54	8	8	61	4	42	61	4	242
1998	66	9	6	53	9	12	72	4	231
1999	82	15	8	53	5	37	69	0	269
2000	78	8	8	58	14	37	62	8	273
2001	81	1	7	61	32	33	108	2	325
2002	95	5	9	53	17	59	65	2	305
2003	73	3	7	71	47	102	67	10	380
2004	69	3	4	72	50	24	51	3	276
2005	79	6	8	89	31	89	90	4	396
2006	92	3	6	70	22	81	116	27	417
2007	73	2	5	59	18	82	66	12	317
2008	90	3	6	101	25	33	72	7	337
2009	97	5	7	114	56	37	103	10	429
2010	83	1	5	97	282	23	208	67	756
2011	87	2	3	77	113	41	116	14	453

Of interest is the increase in the number of perinatal deaths. The frequency of perinatal deaths (stillborn and newborn calves) has been consistently high over the past several years. The cause of the increase in perinatal deaths is uncertain, but may result from a combination of factors that includes pollution, disease, or environmental change (Marine Mammal Commission, 1992). It may also result from the increase in collisions between manatees and watercraft because some newborn calves may die when their mothers are killed or seriously injured by boat collisions, when they become separated from their mothers while dodging boat traffic, or when stress from vessel noise or traffic induces premature births (Marine Mammal Commission, 1992).

The greatest present threat to manatees is the high rate of manatee mortalities caused by watercraft collisions. Between 1974 and 1997, there were 3,270 known manatee mortalities in Florida. Of these, 749 were watercraft-related. Since 1974, an average of 31 manatees have died from watercraft-related injuries each year. Between 1983 and 1993, manatee mortalities resulting from collisions with watercraft reached record levels (DEP, 1994). Between 1986 and 1992, watercraft collisions accounted for 37.3% of all manatee deaths where the cause of death could be determined (Ackerman *et al.,* 1995).

The significance of manatee mortalities related to watercraft appears to be the result of dramatic increases in vessel traffic (O'Shea *et al*., 1985). Ackerman *et al.* (1995) showed a strong correlation between the increase in recorded manatee mortality and increasing boat registrations. In 1960, there were approximately 100,000 registered boats in Florida; by 1990, there were more than 700,000 registered vessels in Florida (Marine Mammal Commission, 1992, Wright *et al.*, 1995). Approximately 97 percent of these boats are registered for recreational use. The most abundant number of registered boats is in the 16-foot to 26-foot size class. Watercraft-related mortalities were most significant in the southwest and northeast regions of Florida; deaths from watercraft increased from 11 to 25 percent in southwestern Florida. In all of the counties that had high watercraft-related manatee deaths, high numbers of watercraft were combined with high seasonal abundance of manatees (Ackerman *et al.*, 1995).

Approximately twice as many manatees died from impacts suffered during collisions with watercraft than from propeller cuts; this has been a consistent trend over the last several years. Medium or large-sized boats cause most lethal propeller wounds, while impact injuries are caused by fast, small to medium-sized boats (Wright *et al.*, 1992). The Florida Marine Research Institute (FMRI) conducts carcass recovery and necropsy activities throughout the state to attempt to assess the cause of death for each carcass recovered.

Designated Critical Habitat for Species Included in this Assessment

Florida Manatee *(Trichecus manatus)*

Critical habitat is defined under the ESA as specific areas within and/or outside a geographical area that are occupied by a species at the time of listing, that contain physical or biological features essential to the conservation of the species and therefore require special management considerations or protection for the benefit of the species. Critical habitat was designated for the manatee in 1976 (50 Code of Federal Regulations [CFR] Part 17.95(a)). It encompasses the all of Lake Worth and includes the action area. Although no specific primary constituent elements (PCEs) were included in the initial critical habitat designation, requirements of the habitat to sustain essential life history functions of manatees can be derived from current literature (USFWS, 2007) which likely include the following:

1. shallow, secluded water areas for resting, mating, and calving (i.e., canals, creeks, lagoons);
2. submerged, emergent, and floating vegetation for foraging;
3. freshwater source for drinking (natural or artificial sources); and
4. unobstructed transiting corridors to warm-water refugia due to manatees' sensitivity to low water temperatures.

Several of these elements are present within Lake Worth and the project area. Resting, mating, and calving are less likely to occur within the deeper federal navigation channel outside of the channel and turning basin than secluded shallower waters located further North and South of the project area. They are more likely to use the shallow edges of the navigation channel as a travel corridor to a freshwater drinking source. There are currently no obstructions within the federal navigation channel, allowing unobstructed transit for the manatees to warm water refuges near the Florida Power and Light Riviera plant.

<u>Project Area Specific Information for Species Included in this Assessment</u>
Florida Manatee *(Trichecus manatus)*

Local Distribution and Status
Manatees are found in marine, brackish and freshwater habitats, including throughout Palm Beach County (PBC), Florida. They can be found along the beaches as well throughout the lagoons and the various natural and man-made waterways of the County (Figure 1). In PBC where the water is relatively clear and shallow, aerial surveys of marine species combined with observations of environmental changes and anthropogenic activities can be particularly effective for evaluating resources and identifying potential or existing threats (PBC 2011). Aerial surveys are flown monthly throughout the year as part of the Palm Beach County Manatee Protection Plan.

In a 2010-11 aerial surveys by Florida Power and Light (FPL), manatees were sighted in Lake Worth on both surveys, with the highest count (554) occurring on 16 December. Calves represented 5.2% of the sightings. The mean count per survey was 449 manatees. Survey conditions were generally excellent in the vicinity of FPL warm water outfall, although visibility elsewhere in Lake Worth was sometimes only good. In 2009, the plant was placed in long-term reserve shutdown, as plans to modernize the plant were promulgated. During the plant shut-down a massive water heater was installed by FPL to ensure that warm water was provided for manatees. The heater discharged warm water when ambient water temperatures dropped to less than 61 degrees F; the location of that discharge was the same as in past years when the plant operated, namely in the so-called "manatee embayment" at the old Units 1 and 2 discharge site. This situation re-occurred in winter 2010-2011, as the power plant will soon be modernized to a more energy-efficient plant, called the Riviera Beach Energy Center (RBEC).

Most manatees observed were located near, but not inside the manatee embayment at the warm water outfall. Individuals were scattered around Lake Worth, especially lining the western shore to the south of the plant. Most manatees at PRV bottom rested, although some fed in the nearby grass beds. A few animals occupied deep-water slips in the Port of Palm Beach. Sea grass distribution and density continue to appear to be sparse around Peanut Island, located just north of the outfall.

Local Mortality

Manatees are subjected to a variety of threats, both natural and human-related. In Florida, there has been a clear increase in the number of manatee deaths over the last quarter-century. Palm Beach County ranks 10th among the 13 key counties, accounting for approximately 3.7 percent of the total State mortality from all causes between 1974 and 2003. The largest single cause (39%) of documented mortality in the County results from collisions with watercraft. Palm Beach County ranks 6th among the 13 key counties in the number of documented watercraft-related mortalities. Manatees are most likely to be struck by boats in areas where there is an overlap between high levels of manatee abundance and boat traffic. Watercraft-related mortalities were highest in the north Lake Worth Lagoon, Jupiter Sound, and the section of Intracoastal Waterway between Delray Beach and Boca Raton. Not surprisingly, 55 percent of all watercraft-related mortalities occurred during January and February, a period of peak manatee abundance. Although watercraft-related mortality has increased within the County since the posting of regulatory speed zones in 1991, the percent of watercraft-related mortality compared to total mortality has remained relatively stable.

Table 2: Manatee deaths in Palm Beach County from 1976 through Oct 31, 2011 (source: FMRI)

Year	Water-craft	Human, Other	Perinatal	Cold stress	Natural	Undetermined	Unrecovered	Total
1976	1	0	0	0	0	0	0	1
1977	4	0	0	0	0	1	2	7
1978	1	0	1	1	0	0	0	3
1979	1	0	1	0	0	1	0	3
1980	0	0	0	0	0	0	0	0
1981	1	0	0	0	0	2	0	3
1982	0	0	1	0	0	1	0	2
1983	2	0	0	0	0	1	0	3
1984	2	0	0	0	1	2	0	5
1985	3	0	0	0	0	0	0	3
1986	1	0	0	2	0	0	3	6
1987	1	0	1	0	1	0	0	3

1988	2	0	1	0	1	0	0	4
1989	0	0	1	0	0	0	0	1
1990	3	0	0	0	1	2	0	6
1991	1	1	0	0	1	3	0	6
1992	0	0	1	0	2	0	0	3
1993	3	1	0	0	1	0	0	5
1994	2	0	1	0	0	0	0	3
1995	2	0	0	0	3	1	0	6
1996	3	0	0	0	2	2	0	7
1997	1	2	1	0	2	0	0	6
1998	2	0	1	0	1	1	0	5
1999	2	2	1	0	1	1	0	7
2000	3	0	2	2	1	1	0	9
2001	3	0	0	0	1	2	0	8
2002	6	0	3	1	1	2	0	13
2003	5	0	2	2	0	3	0	12
2004	3	1	0	2	1	2	0	9
2005	6	0	1	1	0	0	0	8
2006	0	0	1	1	1	4	0	7
2007	0	0	0	2	1	1	0	4
2008	6	0	0	2	0	0	0	8
2009	4	1	1	3	1	6	0	16
2010	2	0	2	6	1	6	1	18
2011	3	0	0	5	0	3	0	11
Totals	79	8	31	30	25	48	6	227

Direct Effects

As previously stated, during winter months a large population of manatees uses the warm water refuge at the FP&L Riviera Power Plant and shallow areas throughout Lake Worth.

The highest potential to directly affect endangered manatees may be the use of explosives to remove areas of rock within the Entrance Channel and Southport Access Channel. Both the pressure and noise associated with blasting can injure marine mammals. Noise and pressure effects to manatees have not been well documented, however, it is assumed that manatees will be impacted similar to dolphins, where documentation is available.

The other highest potential to directly affect manatees would be the use of clamshell dredges. While no documentation is available to substantiate the higher potential impacts, the Corps has agreed to no night time clamshell dredging to further reduce the chance to impact manatees.

<u>Protective Measures Taken in the Project Area as Part of the Proposed Action</u>
Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. It was determined that rock removal options not involving blasting were possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds. This constant pounding would serve to disrupt animal behavior in the area, and result in adverse effects on the mission. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that if rock exists that needs to be pre-treated prior to excavation, blasting is actually the least environmentally impactful method for removing the rock. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock/ substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects is reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve and protect Florida manatees. Foremost among the measures are protective actions to ensure that manatees are not killed if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures.

Standard Manatee Conditions:

The Corps will incorporate the standard manatee protection construction conditions into our plans and specifications for this project. These standard conditions are:

1. The contractor instructs all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s), and shall implement appropriate precautions to ensure protection of the manatee(s).

2. All construction personnel are advised that there are civil and criminal penalties for

harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act. The permittee and/or contractor may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

3. Prior to commencement of construction, the prime contractor involved in the construction activities shall construct and display at least two temporary signs (placard) concerning manatees. For all vessels, a temporary sign (at least 8 1/2" x 11") reading "Manatee Habitat/Idle Speed In Construction Area" will be placed in a prominent location visible to employees operating the vessels. A second temporary sign (at least 8 1/2" x 11") reading "Warning, Manatee Habitat: Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol at 1-800-DIAL-FMP" will be located prominently adjacent to the displayed issued construction permit. Temporary notices are to be removed by the permittee upon completion of construction.

4. All vessels associated with the project operate at "idle speed/no wake" at all times while in the construction area and while in waters where the draft of the vessel provides less than a four foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

5. If manatees are seen within 100 yards of the active daily construction/dredging operation, all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment.

6. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol (1-800-DIALFMP) and to the Florida Department of Protection, Office of Protected Species Management at (904)922-4330.

7. The contractor maintains a log detailing sightings, collisions, or injuries to manatees should they occur during the contract period. A report summarizing incidents and sightings shall be submitted to the Florida Department of Protection, Office of Protected Species Management, Mail Station 245, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399 and to the U.S. Fish and Wildlife Service, 3100 University Boulevard, Jacksonville, FL 32216. This report must be submitted annually or following the completion of the project if the contract period is less than a year.

Confined Blasting

To achieve the widening and deepening of Lake Worth Inlet from the existing depth of -35 feet to project depth of -43 feet, pretreatment of some of the rock areas may be required. The use of confined underwater blasting as a pre-treatment technique is anticipated to be required for some of the deepening and widening of the authorized Federal project, where standard construction methods are unsuccessful due to the hardness of the rock. The following analysis of potential blasting needs for the current project performed by the USACE Engineering Division staff is based on evaluations of core boring logs.

Methods

The focus of the proposed blasting work at Lake Worth is to pre-treat bedrock prior to removal by a dredge utilizing confined blasting, meaning the shots would be "confined" in the rock. In confined blasting, each charge is placed in a hole drilled in the rock approximately 5-10 feet deep below the desired depth (see Figure 4) depending on how much rock needs to be broken and the intended project depth. The hole is then capped with an inert material, such as crushed rock (Figure 5; each bag as shown contains approximate volume of material used per discharge). This process is referred to as "stemming the hole." The blasting charge is set and then the chain of explosives within the rock is detonated.

For the Port of Miami Phase II expansion in 2005, which used blasting as a pre-treatment technique, the stemming material was angular crushed rock. The optimum size of stemming material is material that has an average diameter of approximately 0.05 times the diameter of the blast hole. Material must be angular to perform properly (Konya 2003). For the USACE project, project-specific specification will be prepared by the geotechnical branch of the District. In the Miami Harbor Phase II project, the following requirements were in the specifications regarding stemming material:

> "*Stemming.* All blast holes shall be stemmed. The Blaster or Blasting Specialist shall determine the thickness of stemming using blasting industry conventional stemming calculation. The minimum stemming shall be 2 feet thick. Stemming shall be placed in the blast hole in a zone encompassed by competent rock. Measures shall be taken to prevent bridging of explosive materials and stemming within the hole. Stemming shall be clean, angular to subangular, hard stone chips without fines having an approximate diameter of 1/2-inch to 3/8-inch. A barrier shall be placed between the stemming and explosive product, if necessary, to prevent the stemming from settling into the explosive product. Anything contradicting the effectiveness of stemming shall not extend through the stemming."

It is expected that the specifications for any construction utilizing blasting at Lake Worth would have similar stemming requirements as those that were used for the Miami Harbor Phase II project. The length of stemming material will vary based on the length of the hole drilled, however minimum lengths will be included in the project specific specifications. Studies have shown that stemmed blasts have up to a 60-90% decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Nedwell and Thandavamoorthy, 1992; Hempen *et al*. 2005;

Hempen *et al*. 2007). However, unlike open-water, i.e., unconfined blasts (Figure 6), very little peer-reviewed research exists on the effects that confined blasting can have on marine animals near the blast (Keevin *et al*. 1999). The visual evidence from a typical confined blast is shown in Figure 7.

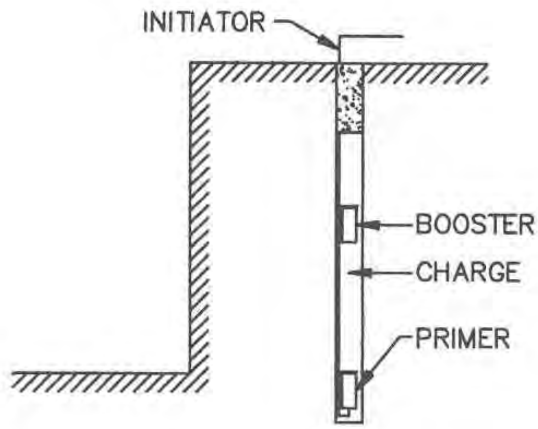

Figure 4 Typical Stemmed Hole for Loading Charges

Figure 5 Stemming Material

Figure 6 Unconfined Blast of Seven Pounds of Explosives

Figure 7 Confined Blast of 3,000 Pounds of Explosives

To estimate the maximum poundage of explosives that may be utilized for this project, USACE has reviewed previous blasting projects, one at San Juan Harbor, Puerto Rico in 1994 and one at Miami Harbor in 2005. The San Juan Harbor project's heaviest delay was 375 lbs per delay and in Miami it was 376 lbs per delay. Based on discussions with USACE's geotechnical engineers, it is expected that the maximum weight of delays for Lake Worth will be larger since the rock is much harder than what is seen at the Port of Miami. It is unknown at this time what the maximum delay weight will be for Lake Worth. This will be determined during the test blast program.

Minimization of Confined Blasting Impacts to Manatees

Blast specifications. Although the rock at Lake Worth is believed to be softer than Miami or San Juan Harbors, as noted above, USACE biologists, working with senior geologists, concluded that the assumptions set forth concerning minimization of the effects of blasting are applicable and accurate for the Lake Worth project. To that effect, based upon industry standards and USACE Safety & Health Regulations, the blasting program may consist of the following:

1) The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock.
2) Drill patterns are restricted to a minimum of 8-foot separation from a loaded hole.
3) Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
4) Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
5) Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
6) The blast design will consider matching the energy in the "work effort" of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.
7) Delay timing adjustments to a minimum of 8 ms between delay detonations to stagger the blast pressures and prevent cumulative addition of pressures in the water.

Safety radii. Furthermore, the confined blasting program will incorporate the use of three safety radii (Figure 8) typically utilized for projects involving unconfined blasts. This conservative use of an *unconfined* blast in development of the safety radii for a *confined* blast will increase the protections afforded marine species in the area. These three zones are referred to as the "Danger zone" – which is the inner most zone, located closest to the blast; the "Safety zone" – which is the middle zone and the "Watch zone" the outer most zone.

The danger zone radius will be calculated to determine the maximum distance from the blast at which mortality to protected marine species is likely to occur. The danger zone was determined by the amount of explosives used within each delay (which can contain multiple boreholes). These calculations are based on impacts to terrestrial animals in water when exposed to a detonation suspended in the water column (unconfined blast) as researched by the U.S. Navy in the 1970s (Yelverton *et al*. 1973; Richmond *et al.* 1973) as well as observations of sea turtle injury and mortality associated with unconfined blasts for the cutting of oil rig structures in the Gulf of Mexico (Young 1991; Young and O'Keefe 1994). The reduction of impact by confining the shots would more than compensate for the presumed higher sensitivity of marine species. USACE believes that the danger zone radius, coupled with a strong protected species observation and protection plan is a conservative, but prudent, approach to the protection of marine wildlife species. Based on a review by NMFS-OPR for the Miami Harbor phase II project, NMFS and FWS found these protective measures sufficient to protect marine mammals under their respective jurisdictions (NMFS 2005; FWS 2002).

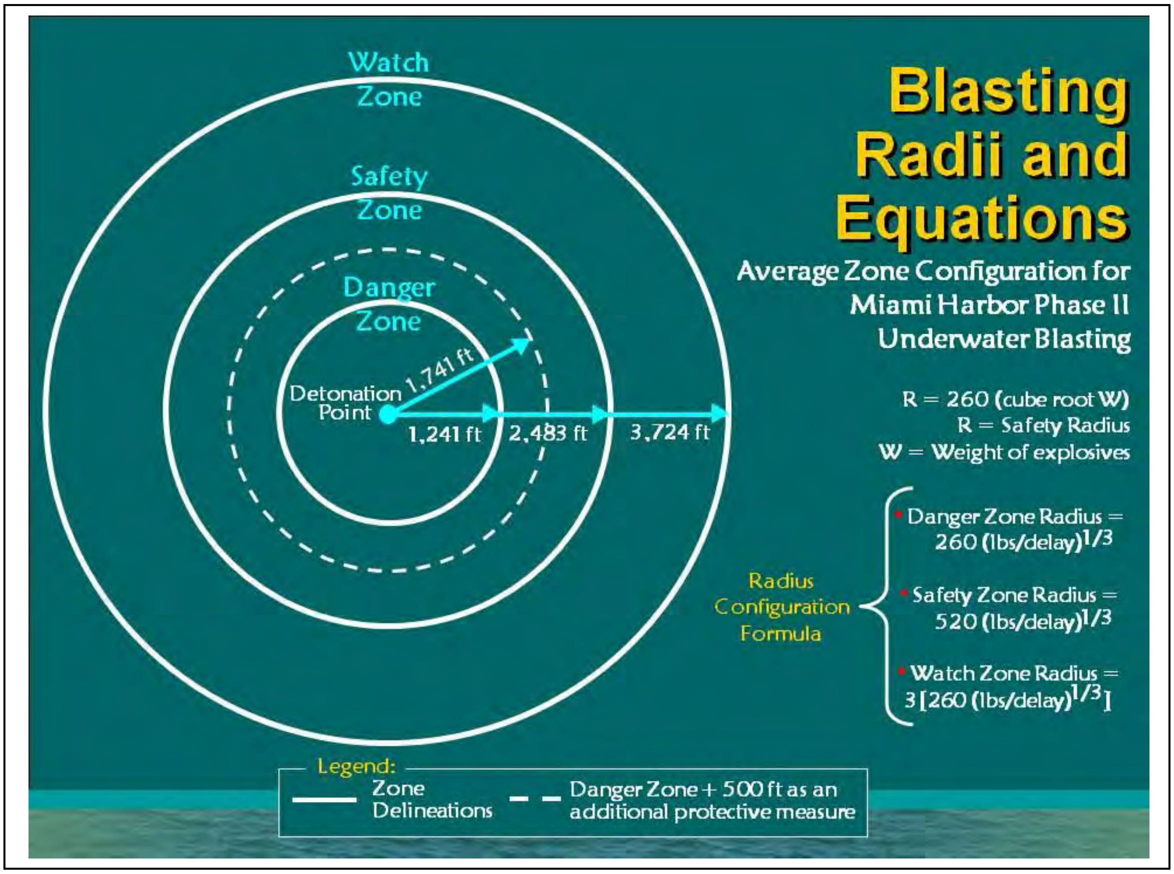

Figure 8 Blast Zone Radii and Equations

These zone calculations will be included as part of the specifications package that the contractors will bid on before the project is awarded. Ideally the safety radius should be large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed.

Radii specifications are as follows:

> 1) Danger Zone (NMFS refers to this as the Caution Zone): The radius in feet from the detonation beyond which no expected mortality or injury from an open water explosion is likely to occur (NMFS 2005). The danger zone (ft) = 260 [79.25 m] X the cube root of weight of explosives in lbs per delay (equivalent weight of TNT).
>
> 2) The Safety Zone is the approximate distance in feet beyond which injury (Level A harassment as defined in the MMPA) is unlikely to occur from an open water explosion (NMFS 2005). The safety zone (ft) = 520 [158.50 m] X cube root of weight of explosives in lbs per delay (equivalent weight of TNT).
>
> 3) The Watch Zone is three times the radius of the Danger Zone to ensure that animals entering to traveling close to the Exclusion Zone are spotted and appropriate actions can be implemented before or as they enter any impact areas (i.e., a delay in blasting activities).
>
> 4) Exclusion Zone extends to 500 feet outside the Danger Zone radius. Detonation will not occur if a marine mammal or reptile may be within that zone (based on observational data).

Because of the potential duration of the blasting and the proximity of the inshore blasting to a seasonal manatee high use area (Lake Worth FPL discharge canal), a number of issues will need to be addressed. Due to the likelihood of a large number of manatees in the area during the winter months, USACE has agreed as part of the ESA consultation with USFWS not to blast between November 15 and March 15 of each year. Other dredging and construction activities may take place inside the Port during this period of time, but blasting will not be utilized during this period.

It is crucial to balance the demands of the blasting operations with the overall safety of protected species in the project area. A radius that is excessively large will result in significant delays that prolong the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. Because of these factors, the goal is to establish the smallest radius possible without compromising animal safety and provide adequate observer coverage for whatever radius is agreed upon.

Monitoring/watch plan. A watch plan will be formulated based on the required monitoring radii and optimal observation locations. The watch plan will be consistent with the program that was utilized successfully at Miami Harbor in 2005 and will consist of at least five observers including at least one (1) aerial observer, two (2) boat-based observers, and two (2) observers stationed on the drill barge (Figures 9,10,11,12). The 6th observer will be placed in the most optimal observation location (boat, barge or aircraft) on a day-by-day basis depending on the location of the blast and the placement of dredging equipment. This process will insure complete coverage of the three zones as well as any critical areas. The watch will begin at least one-hour prior to each blast and continue for one-half hour after each blast (Jordan *et al*. 2007).

Specific flight and observing plans will be coordinated with the FAA and Palm Beach County Aviation Department to determine if aerial overflights are authorized throughout the entire project. If any conflicts develop that would prevent overflights of specific areas of the project that have been determined to require blasting, alternative monitoring methodologies will be investigated and coordinated with the resource agencies with jurisdiction for those issues.

Figure 9   Typical observer helicopter

Figure 10 View of typical altitude of aerial observer operations

Figure 11 Typical vessel for boat-based observer

Figure 12   Observer on Drill Barge

<u>Vibration and Pressure Monitoring</u>

Vibration. In an urban environment such as the Port, which is surrounded by commercial properties, utilities, and residential communities, protection of structures must be considered. Once the areas of the project requiring blasting have been identified, critical structures within the blast zones would be determined. Where vibration damage may occur, energy ratios and peak particle velocities shall be limited in accordance with state or county requirements, whichever is more stringent. Furthermore, vibration-monitoring devices will be installed to ensure that established vibration limits are not exceeded. If the energy ratio or peak particle velocity limits are exceeded, blasting will be stopped until the probable cause has been determined and corrective measures taken. Critical monitoring locations may include structures such as bulkheads, hazardous materials storage areas, and buried utilities.

Ground-borne vibration can be generated by a number of sources, including road and railways, construction activities such as piling, blasting and tunneling. Vibration can be defined as regularly repeated movement of a physical object about a fixed point. The parameter normally used to assess the ground vibration is the peak particle velocity (PPV) expressed in millimeters per second (mm/s). In order to completely define ground vibration, the amplitude and frequency of the motion are measured in the three orthogonal directions generally in terms of velocity which is considered to be the best descriptor for assessing human comfort and the potential damage response of structures. The vibration velocity signals are summed (in real time) and the maximum amplitude of this vector sum is defined as the Peak Vector Sum (PVS). Vibration can cause varying degrees of damage in buildings and affect vibration-sensitive machinery or equipment. Its effect on people may be to cause disturbance or annoyance or, at higher levels, to affect a person's ability to work.

USACE reviewed data from the two most recent blasting projects completed by the district: the deepening of San Juan Harbor in 2000 and of Miami Harbor in 2005. Both used confined underwater blasting. Both projects had significant structural resources located near the blast that were of concern (the San Juan site included the National Park Service's Castillo San Felipe del Morro, a 400+ year old fortress overlooking the harbor and 30 additional historic sites within boundaries of the National Monument). In Miami, the harbor is bounded on the north by the port facilities and on the south by Fisher Island, a residential island. In both cases, a network of monitoring locations was established by the blasting contractor to capture vibration associated with the detonation of each blast. Additionally, at El Morro, the contractor installed monitoring devices on each crack in the stucco that covers the structure's interior walls, and a photo was taken after installation to serve as a pre-construction baseline. During construction, the crack was monitored throughout the blasting project to ensure that crack's width or length had not increased (Figure 13).

At Miami the maximum PVS allowed for the project was 1.0 mm/s. The average maximum PVS for the Miami Harbor deepening in 2005 was 0.3828mm/s with a range of 0.0819mm/s - 1.08mm/s during the 40 blast detonations. During both projects, no adverse impacts were reported to any of the surrounding structures by either the vibration monitoring contractor, or the building's owners/trustees.

Air Pressure. The USACE Safety and Health Requirements Manual (EM 385-1-1 3, September 1996) limits of "air blast pressure exerted on structures resulting from blasting shall not exceed 133 dB (0.013 psi)" and industry standard vibration limitations would be incorporated into the design process. A conservative regression analysis of similar projects may be used to develop the design and then continually updated with calibration of the environment. The contractor will also be required to abide by state and local blasting requirements in addition to the USACE Safety Manual previously referenced in this paragraph.

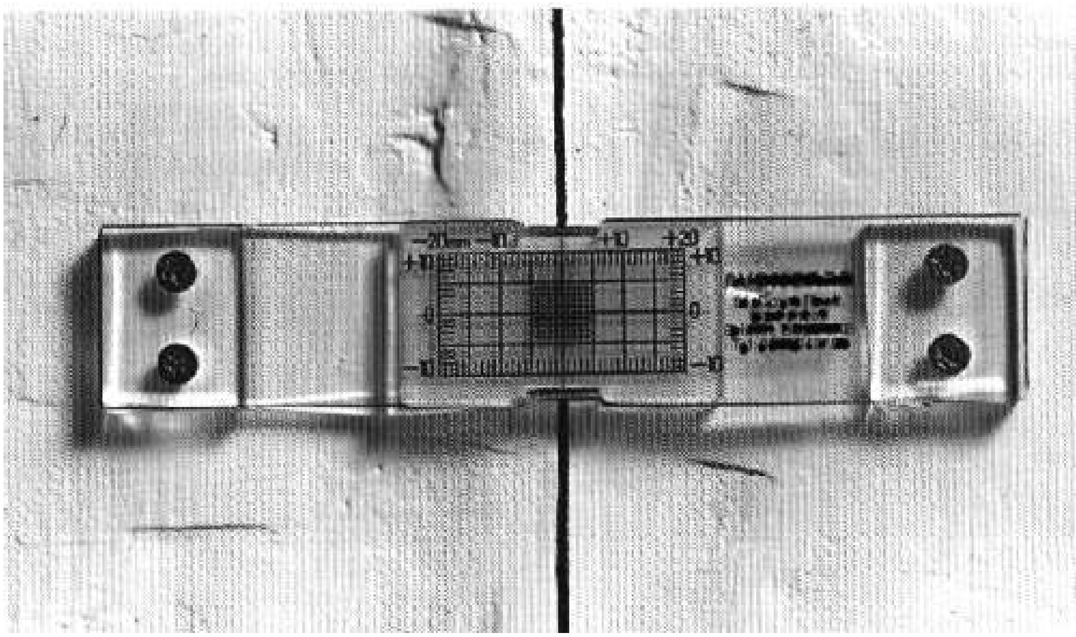

Figure 1 Typical Crack Monitor Device

Duration of Confined Blasting During Construction

The duration of the blasting (pre-treatment) is dependent upon a number of factors including hardness of rock, how close the drill holes are placed, and the type of equipment that will be used to remove the pretreated rock. For comparison, the harbor deepening project at Miami Harbor in 2005-2006 estimated between 200-250 days of blasting with one-shot per day (a blast-day) to pre-treat the rock associated with that project. However the contractor completed the project in 38 days with 40 blasts. The upcoming expansion at Miami Harbor scheduled to begin in summer/fall of 2012 currently estimates 600 blast-days for the entire project footprint. However, the actual number of blast days may be reduced by the contractors, based on the previously mentioned factors. This estimate of how many days of blasting would be needed to complete the work will be estimated with detailed geotechnical analysis during the preconstruction, engineering and design (PE&D) phase of the project.

Adaptive Improvement of Blasting Specifications and Methods

Test Blast Program. Prior to implementing a construction blasting program a test blast program will be completed. The test blast program will have all the same protection measures in place for protected species monitoring and protection as blasting for construction purposes. The purpose of the test blast program is to demonstrate and/or confirm the following:

- Drill Boat Capabilities and Production Rates
- Ideal Drill Pattern for Typical Boreholes
- Acceptable Rock Breakage for Excavation
- Tolerable Vibration Level Emitted
- Directional Vibration
- Calibration of the Environment

The test blast program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. The test blast program will take place in the project area and will count toward the pre-treatment of material, since the blasts of the test blast program will be cracking rock. Each test blast is designed to establish limits of vibration and air blast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the test blast program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for construction blasting plan. During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds Per Delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak Vector Sum
- Air Blast, Overpressure

In order to provide dependable verification of presence of manatees within the blast zone, a detection system was designed which included the following three provisions:

- Provision 7: A trained observer will be stationed on the sighting tower or catwalk of the dynamite drill barge.

- Provision 8: An observer in a boat will make a systematic survey of the danger zone prior to blasting.

- Provision 9: An electronic color enhanced fathometer will be utilized to monitor underwater manatee movement.

Additionally, special conditions will be placed into the specifications for the project to protect manatees in the area.

1. A marine mammal watch will be conducted by no less than 2 qualified observers from a small watercraft, at least ½ hour before and after the time of each detonation, in a circular area at least three times the radius of the above described danger zone (this is called the watch zone).
2. Any marine mammal(s) in the danger zone or the watch zone shall not be forced to move out of those zones by human intervention. Detonation shall not occur until the animals(s) move(s) out of the danger zone on its own volition.
3. No blasting will occur during the “manatee season”.
4. In the event a marine mammal or marine turtle is injured or killed during blasting, the Contractor shall immediately notify the Contracting Officer as well as the following agencies:
    a. Florida Marine Patrol "Marine Mammal Stranding Hotline" 1-800-342-5367
    b. FWS – Vero Beach Office
    c. National Marine Fisheries Service – Protected Resources Division, St. Petersburg

Take Analysis

Due to the restrictions and special conditions placed in our construction specifications the Corps does not anticipate any take of the endangered Florida manatee.

Determination

The Corps has determined that the proposed widening and deepening Lake Worth Inlet is likely to affect, but not likely to adversely affect listed species within the action area. The Corps believes that the restrictions placed on the blasting previously discussed in this assessment will diminish the effect of the project on protected species within the action area. The Corps has also determined that the project will not adversely modify critical habitat for the Florida manatee.

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

JUL 0 6 2012

Planning Division
Environmental Branch

Mr. David Bernhart
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
Saint Petersburg, FL 33701

Dear Mr. Bernhart:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment for the Lake Worth Inlet Widening and Deepening addressing the concerns of the threatened and endangered species under the purview of the National Marine Fisheries Service (NMFS). Listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the NMFS are: green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), Hawksbill sea turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), Johnson's seagrass (*Halophila johnsonii*), blue (*Balenoptera musculus*), humpback, (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), fin (*Balenoptera physalus*) and sperm (*Physeter macrocephalus*) whales and smalltooth sawfish (*Pristis pectinata*). Based on the enclosed Biological Assessment, the Corps has determined that the proposed expansion of Lake Worth Inlet may adversely affect Johnson's seagrass within the action area. The proposed project may affect, but not likely to adversely affect; the green turtle, loggerhead turtle, Kemp's ridley turtle, Hawksbill turtle, leatherback turtle, humpback whale, sperm whale, and smalltooth sawfish. The Corps requests your written concurrence on this determination.

If you have any questions or need further information, please contact Mr. Pat Griffin at 904-232-2286 or by email: Patrick.M.Griffin@usace.army.mil.

Sincerely,

Kenneth R Dugger
for
Eric P. Summa
Chief, Environmental Brach
Planning Division

Enclosure

Biological Assessment to
National Marine Fisheries Service
Lake Worth Inlet Widening and Deepening
Palm Beach County, Florida

Description of the Project Area – Palm Beach Harbor is on the Atlantic coast of Florida, approximately 53 miles south of Fort Pierce Harbor, and 71 miles north of Miami Harbor. The harbor entrance (also known as Lake Worth Inlet) is an artificial cut through the barrier beach and limestone formation connecting Lake Worth, a coastal lagoon, with the Atlantic Ocean. Communities bordering Palm Beach Harbor are Palm Beach Shores on the barrier beach to the north, Riviera Beach on the west shore of Lake Worth, and the town of Palm Beach to the south. West Palm Beach is located immediately south of Riviera Beach and is the largest community in the area. Lake Worth Inlet contains a federally autheroized channel and associated features which support a deepwater port located on the Atlantic Ocean in Palm Beach County, Florida.

Lake Worth is an estuary that exhibits characteristics typical of estuarine systems in southeast Florida. Much of the beach and dune ecosystem in this vicinity has been altered by development. Structures such as seawalls and bulkheads have reduced a significant amount of the vegetation that would naturally occur here (Applied Technology and Management Inc. 1995).

The existing channel sediments in the Inlet are predominantly sand and shell and are subject to considerable shifting by wave and tidal action. Limestone rock outcrops are found on either side of the Federal channel at the interface between the Inlet channel and the Intracoastal Waterway (IWW). Littoral drift in the area is predominantly north to south. The mean tidal range is 2.8 feet and the spring tidal range is 3.3 feet. Shoaling continues to be a recurring problem in Palm Beach Harbor.

A sand transfer plant is located on the north jetty of the inlet. The sand transfer plant takes the sand that accumulates on the north jetty, slurries the material with sea water, and passes it under the inlet and to the beach south of the south jetty. Sand continues to accumulate at a rapid rate in this area. The areas to be dredged are located within the Federal project limits.

Action Area
The project proposes to widen and deepen Lake Worth Inlet navigation channel (Figure 1). The authorized project depths are as follows: entrance channel to a depth of 37 feet (from STA 30+00 to STA 47+00); from the inner channel to a depth of 33 feet; from the turning basin to a depth of 33 feet; and to a depth of 25 feet in the extended turning basin located north of the existing project basin. The existing settling basin and the extended settling basin are maintained at 35 feet and are located adjacent to the entrance channel and north jetty.

Deepening will occur within the entrance channel from the current 37 feet to 47 feet, with depths within the turning basin increasing from 33 feet to 43 feet deep. Widening is needed in certain areas of the project for safe navigation of larger vessels. The entrance channel requires a flare to the south as prevailing currents cause navigation hazards entering the channel as currently configured. The flare starts at the south jetty and extends approximately 2500 feet to the southeast. Within the entrance channel, the northern channel wall would be widened by 60 feet from the north jetty to the beginning of the turn to the southwest. At the turn, the northern side of the channel would be widened 150 feet to ensure a 400 foot channel width throughout. The area at the southern edge of Peanut Island would be deepened to 43 feet. Finally, the southern edge of the turning basin would be widened 150 feet to the south.

Based on geotechnical boring data from the entrance channel and turning basin, sand and rock of varying hardness are expected to be encountered during widening and deepening. Sand, soft rock and rock fragments will be removed via traditional dredging methods. Where hard rock is encountered, the Corps anticipates that contractors could utilize other methods, including confined blasting or large cutterhead dredge equipment to pre-treat the rock prior to removal. Dredged material would be deposited at up to four locations. All beach quality sand material shall be placed on the existing beach disposal template just south of the inlet (figure 2). Sandy material not considered beach quality under the existing permit will be placed in the authorized nearshore placement site south of the inlet. Other rock/coarse materials would likely be placed in a previously dredged depression within Lake Worth as part of construction to create seagrass habitat as compensatory mitigation for seagrass impacts. Dredged rock and other materials that cannot be beneficially utilized for mitigation may be transported to the Ocean Dredged Materials Disposal Site (ODMDS) or placed in a permitted, upland disposal site on Peanut Island.

Figure 1: Current project and proposed changes in yellow

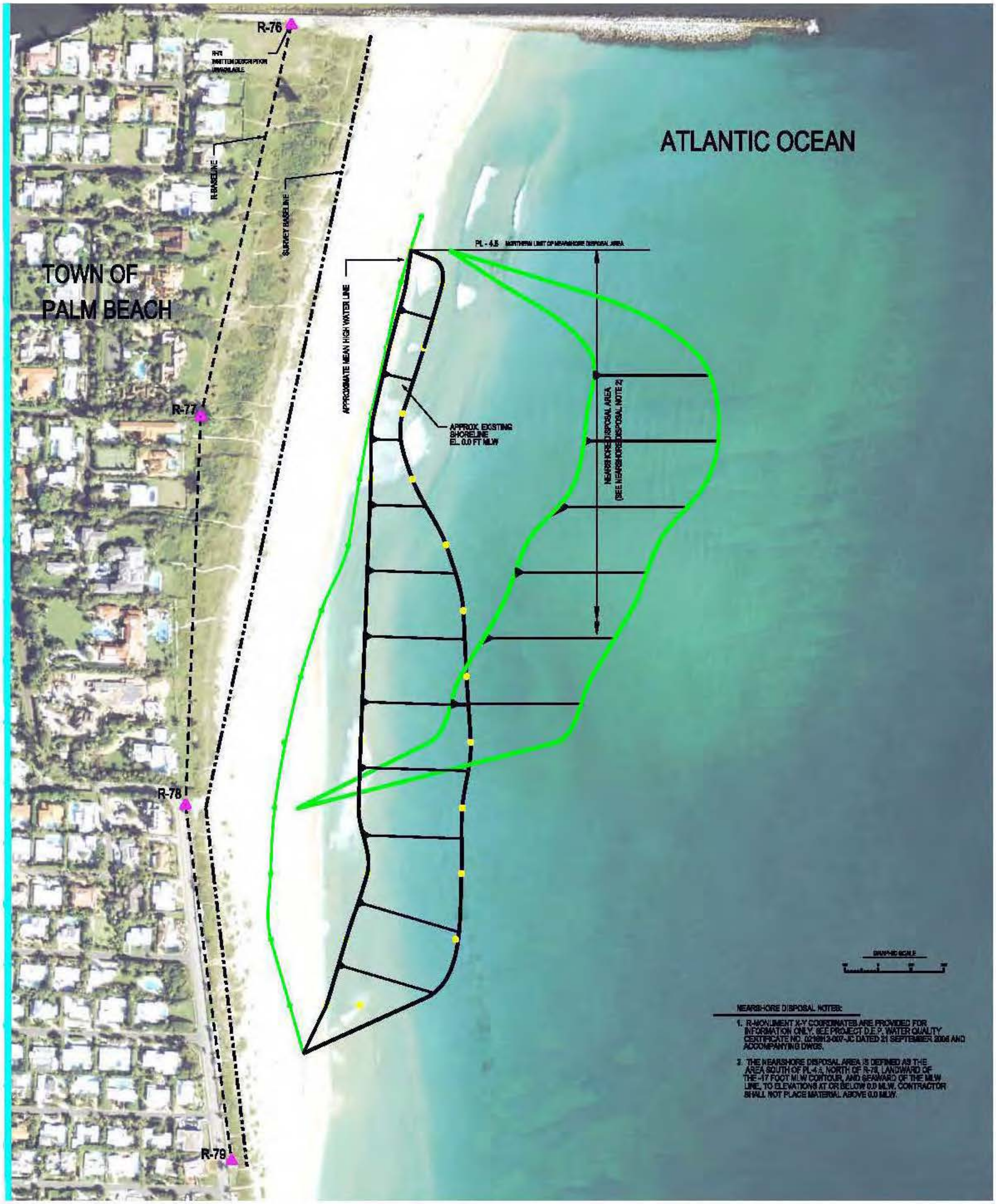


Figure 2. Beach placement site south of inlet

Protected Species Included in this Assessment

The U.S. Army Corps of Engineers, Jacksonville District (Corps) has determined that the following listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) occur in the action area: green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), Hawksbill sea turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), Johnson’s seagrass (*Halophila johnsonii*), blue (*Balenoptera musculus*), humpback, (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), fin (*Balenoptera physalus*) and sperm (*Physeter macrocephalus*) whales and smalltooth sawfish (*Pristis pectinata*). The Corps has relied heavily upon the Surtass LFA Biological Opinion that was completed by NMFS on May 31, 2002 for biological information concerning the biology, life history and status for the large whale species discussed in this assessment. This document was accessed from the NMFS website at: http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/7pr_surtass-2020529.pdf.

The Corps has reviewed the biological, status, threats and distribution information presented in this assessment and believes that the following species will be in or near the action area and thus may be affected by the proposed project: the five sea turtle species; humpback and sperm whales, Johnson’s seagrass and smalltooth sawfish.

Six species of endangered marine mammals may be found seasonally in the waters offshore southeastern Florida. The Corps believes that only the sperm and humpback whales may be adversely affected by activities associated with the proposed action. These effects would be a result of acoustic harassment.

The blue, fin, northern right and sei whales are not discussed in detail because they are unlikely to be within the vicinity of the project. Additional information on blue, fin and sei whales can be found in Waring *et al*. (1999). Due to the rarity of sightings of these four whale species near the project area, the Corps believes that any effects to them by the project are discountable. Discountable effects under Section 7 of the ESA are those “extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.”

The endangered Florida manatee (*Trichecus manatus*) and the American crocodile (*Crocodylus acutus*) also occur with the action area and the Corps has initiated consultation with the U.S. Fish and Wildlife Service concerning the effects of the proposed action on these species.

Status and Distribution of the Species

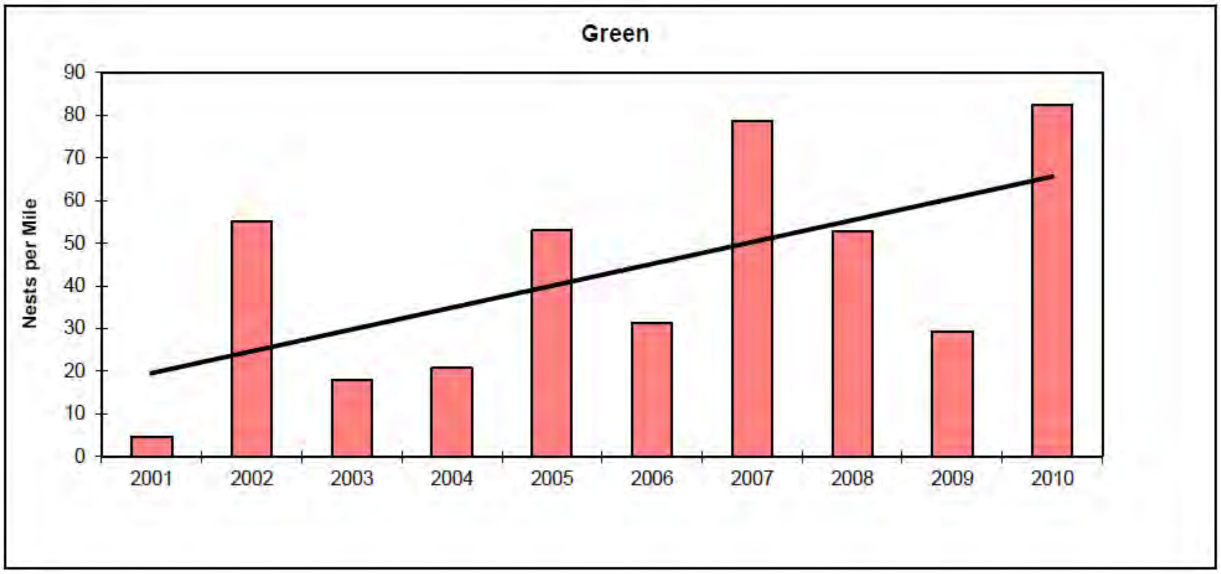
Green Turtle

Distribution. Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz, 1999). Several major nesting assemblages have been identified and studied in the western Atlantic (Peters 1954; Carr and Ogren, 1960; Carr *et al.*, 1978). Most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart 1979). Green turtles are the largest of the hard-shelled sea turtles. Adult male green turtles are smaller than adult females whose lengths range from 92 to 110 cm (36 to 43 in.) and weights range from 119 to 182 kg (200 to 300 lbs). Their heads are small compared to other sea turtles and the biting edge of their lower jaws is serrated.

Green turtles have a more tropical distribution than loggerhead turtles; they are generally found in waters between the northern and southern 20°C isotherms (Hirth 1971). Green turtles, like most other sea turtles, are distributed more widely in the summer when warmer water temperatures allow them to migrate north along the Atlantic coast of North America. In the summer, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and continental North America from Texas to Massachusetts. Immature greens can be distributed in estuarine and coastal waters from Long Island Sound, Chesapeake Bay, and the North Carolina sounds south throughout the tropics (Musick and Limpus, 1997). In the United States, green turtles nest primarily along the Atlantic Coast of Florida, the U.S. Virgin Islands, and Puerto Rico. In the winter, as water temperatures decline, green turtles that are found north of Florida begin to migrate south into subtropical and tropical water.

Status and Population Trends. The green turtle was protected under the ESA in 1978; breeding populations off the coast of Florida and the Pacific coast of Mexico are listed as endangered, all other populations are listed as threatened. Recent population estimates for the western Atlantic area are not available. However, there is evidence that green turtle nesting has been on the increase during the past decade. Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the six years of regular monitoring since establishment of the index beaches in 1989. A nesting summary for the county in which the proposed project resides is found in Table 1.

Table 1: Summary of Green Turtle (*Chelonia mydas*) Nesting in Palm Beach County, 2001-2010



Natural History. While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida, the northwestern coast of the Yucatan Peninsula, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Post-pelagic green turtles feed primarily on sea grasses and benthic algae but also consume jellyfish, salps, and sponges. In the western Atlantic region, the summer developmental habitat encompasses estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds, and south throughout the tropics (Musick and Limpus, 1997). Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to southern waters in autumn, or face the risk of cold stunning.

Threats. The greatest threat to this species is the loss of its nesting habitat. Throughout the tropical and subtropical distribution of this species, beaches are eroded, armored, renourished, or converted for residential or commercial purposes. Green turtles are also threatened by fibropapilloma disease; incidental takes in commercial or recreational fishing gear; and poaching (although poaching is infrequent in the United States). Green turtles are harvested in some nations for food, leather, and jewelry. Green turtles are also threatened by natural causes including hurricanes; predation by fire ants, raccoons, and opossums; and poaching of eggs and nesting females.

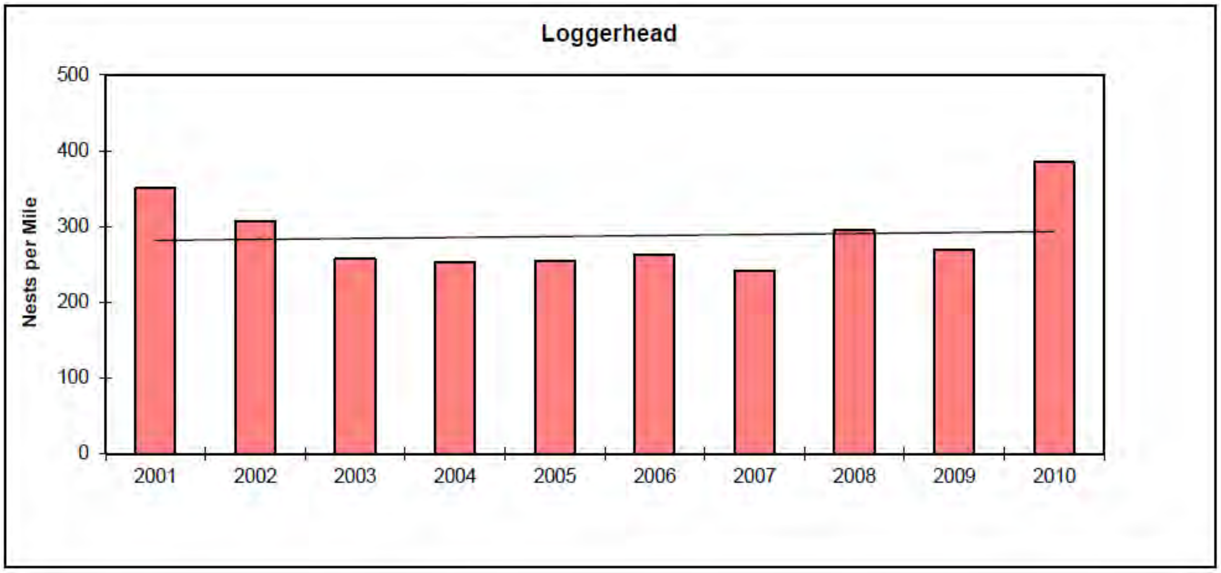
Anthropogenic impacts to the green turtle population are similar to those for other sea turtle species. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. In addition, the NMFS/Northeast Fisheries Science Center (NEFSC) is conducting a review of bycatch levels and patterns in all fisheries in the western Atlantic for which observer data is available. Bycatch estimates will be made for all fisheries for which sample sizes are sufficiently large to permit reasonable statistical analysis. This will be compiled into an assessment report. Until that analysis is completed, the only information on the magnitude of takes available for fisheries in the action area are unextrapolated numbers of observed takes from the sea sampling data. Preliminary sea sampling data summary (1994-1998) shows the following total take of green turtles: one (anchored gillnet), two (pelagic driftnet), and two (pelagic longline). Stranding reports indicate that between 200-300 green turtles strand annually from a variety of causes (Sea Turtle Stranding and Salvage Network, unpublished data). As with the other species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality.

Critical Habitat. In 1998, NMFS designated the waters surrounding the islands of Culebra, Puerto Rico as critical habitat for the green turtle. This area supports major seagrass beds and reefs that provide forage and shelter habitat. The action area does not comprise critical habitat for green turtles.

Loggerhead Turtle

Distribution. Loggerhead turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerheads concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (NRC 1990). The largest known nesting aggregation of loggerhead turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani, 1982). In the western Atlantic, most loggerhead turtles nest from North Carolina to Florida and along the gulf coast of Florida. The best scientific and commercial data available on the genetics of loggerhead turtles suggests there are four major subpopulations of loggerheads in the northwest Atlantic: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29^{o} N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29^{o} N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); and (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990) (approximately 1,000 nests in 1998, according to TEWG, 2000). This biological assessment will focus on the northwest Atlantic subpopulations of loggerhead turtles, which occur in the action area. A nesting summary for the county in which the action is proposed is included in Table 2.

Table 2: Summary of Loggerhead (*Caretta caretta*) Nesting in Palm Beach County, 2001-2010



Although NMFS and FWS have not completed the administrative processes necessary to formally recognize populations or subpopulations of loggerhead turtles, these sea turtles are generally grouped by nesting locations. Based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG 2000), NMFS and FWS treat these loggerhead turtle nesting aggregations as distinct subpopulations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the four nesting aggregations of loggerhead turtles identified in the preceding paragraph (which occur in the action area) and treat them as subpopulations for the purposes of this analysis. Natal homing to the nesting beach provides the genetic barrier between these subpopulations, preventing recolonization from turtles from other nesting beaches. The importance of maintaining these subpopulations in the wild is shown by the many examples of extirpated nesting assemblages in the world. In addition, recent fine-scale analysis of mtDNA work from Florida rookeries indicate that population separations begin to appear between nesting beaches separated by more than 50-100 km of coastline that does not host nesting (Francisco *et al.* 2000) and tagging studies are consistent with this result (Richardson 1982, Ehrhart 1979, CMTTP: in NMFS SEFSC 2001). Nest site relocations greater than 100 km occur, but generally are rare (Ehrhart 1979; CMTTP; Bjorndal *et al.* 1983: *in* NMFS SEFSC 2001).

The loggerhead turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9% of the loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead turtles in this area are from the northern subpopulation (NMFS SEFSC 2001; Bass *et al*., 1998; Norrgard, 1995; Rankin-Baransky, 1997; Sears 1994, Sears *et al.*, 1995). In the Carolinas, the northern subpopulation is estimated to make up from 25% to 28% of the loggerheads (NMFS

SEFSC 2001; Bass *et al.* 1998, 1999). About ten percent of the loggerhead turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell *et al*., in prep). In the Gulf of Mexico, most of the loggerhead turtles in foraging areas will be from the South Florida subpopulation, although the northern subpopulation may represent about 10% of the loggerhead sea turtles in the Gulf (Bass pers. comm). In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads are from the South Florida subpopulation and about two percent are from the northern subpopulation, while only about 51% originated from Mediterranean nesting beaches (Laurent *et al.*, 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19% of the pelagic loggerheads are from the northern subpopulation, about 71% are from the South Florida subpopulation, and about 11% are from the Yucatán subpopulation (Bolten *et al*., 1998).

Natural History. Loggerhead turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal *et al*., in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm SCL they recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder *et al*., 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals actually are more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool (Epperly *et al.*, 1995; Keinath, 1993; Morreale and Standora, 1999; Shoop and Kenney, 1992), and migrate northward in spring. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart, 1985; Frazer and Limpus, 1998), the benthic immature stage must be at least 10-25 years long. NMFS SEFSC 2001 analyses conclude that juvenile stages have the highest elasticity and maintaining or decreasing current sources of mortality in those stages will have the greatest impact on maintaining or increasing population growth rates.

Like other sea turtles, the movements of loggerheads are influenced by water temperature. Since they are limited by water temperatures, sea turtles do not usually appear on the summer foraging grounds until June, but are found in Virginia as early as April. The large majority leaves the Gulf of Maine by mid-September but may remain in these areas until as late as November and December. Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz, 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets) (NMFS and USFWS, 1991).

Adult female loggerheads in the western Atlantic come ashore to nest primarily from North Carolina southward to Florida. Additional nesting assemblages occur in the Florida Panhandle and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Threats. Loggerhead sea turtles face a number of human-related threats in the marine environment, including oil and gas exploration, development, and transportation; marine pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries (see below); underwater explosions; dredging, offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching.

Although loggerhead turtles are most vulnerable to pelagic longlines during their pelagic, immature life history stage, there is some evidence that benthic immatures may also be captured, injured, or killed by pelagic fishery operations. Recent studies have suggested that not all loggerhead turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the North Atlantic. In addition, some of these turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or they may move back and forth between pelagic and coastal habitats (Witzell , 1999.). Any loggerhead turtles that follow this developmental model would be adversely affected by shark gill nets and shark bottom longlines set in coastal waters, in addition to pelagic longlines.

On their nesting beaches in the U.S., loggerhead turtles are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; exotic dune and beach vegetation; predation by fire ants, raccoons, armadillos, opossums; and poaching. Elimination/control of these threats are especially important because, from a global perspective, the southeastern U.S. nesting aggregation is critical to the survival of this species: it is second in size only to the nesting aggregations in the Arabian Sea off Oman and represents about 35 and 40 percent of the nests of this species. The status of the Oman nesting beaches has not been evaluated recently, but they are located in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills), the resulting risk facing this nesting aggregation and these nesting beaches is cause for considerable concern (Meylan *et al*., 1995).

Loggerhead turtles also face numerous threats from weather and coastal processes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and loggerhead turtle nesting season (March to November); hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton *et al*., 1992). On Fisher Island near Miami, Florida, 69% of the eggs did not hatch after Hurricane Andrew, probably because they were drowned by the storm surge. Nests from the northern subpopulation were destroyed by hurricanes, which made landfall in North Carolina in the mid to late 1990's. Sand accretion and rainfall that result from these storms can appreciably reduce hatchling success. The recent landfall of Hurricane Charley on Florida's southwest coast and the impending landfall of Hurricane Frances will also have adverse effects on nest success. These natural phenomena probably have significant, adverse effects on the size of specific year classes; particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Status and Population Trends. The loggerhead turtle was listed as threatened under the ESA on July 28, 1978. The most recent work updating what is known regarding status and trends of loggerhead sea turtles is contained in NMFS SEFSC 2001. The recovery plan for this species (NMFS and USFWS 1991) state that southeastern U.S. loggerheads can be considered for delisting if, over a period of 25 years, adult female populations in Florida are increasing and there is a return to pre-listing annual nest numbers totaling 12,800 for North Carolina, South Carolina, and Georgia combined. This equates to approximately 3,100 nesting females per year at 4.1 nests per female per season. NMFS SEFSC 2001 concludes, "…nesting trends indicate that the numbers of females associated with the South Florida subpopulation are increasing. Likewise, nesting trend analyses indicate potentially increasing nest numbers in the northern subpopulation" (TEWG 2000). However, NMFS SEFSC 2001 also cautions that given the uncertainties in survival rates (of the different life stages, particularly the pelagic immature stage), and the stochastic nature of populations, population trajectories should not be used now to quantitatively assess when the northern subpopulation may achieve 3,100 nesting females.

Several published reports have presented the problems facing long-lived species that delay sexual maturity in a world replete with threats from a modern, human population (Crouse *et al.*, 1987, Crowder *et al.*, 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general tenet of population ecology originated in studies of sea turtles (Crouse *et al.*, 1987, Crowder *et al.*, 1994, Crouse 1999). Crouse (1999) concluded that relatively small changes in annual survival rates of both juvenile and adult loggerhead sea turtles would adversely affect large segments of the total loggerhead sea turtle population.

The four major subpopulations of loggerhead sea turtles in the northwest Atlantic, northern, south Florida, Florida panhandle, and Yucatán are all subject to fluctuations in the number of young produced annually because of natural phenomena like hurricanes as well as human-related activities. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. Sea turtles nesting in the southern and central counties of Florida can be affected by beach armoring, beach renourishment, beach cleaning, artificial lighting, predation, and poaching (NMFS & FWS 1991).

As discussed previously, the survival of juvenile loggerhead sea turtles is threatened by a completely different set of threats from human activity once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North

Atlantic over several years (Carr 1987, Bjorndal 1994). During that period, they are exposed to a series of long-line fisheries that include an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar *et al*., 1995, Bolten *et al.*, 1994, Crouse 1999). Based on their proportional distribution, the capture of immature loggerhead sea turtles in long-line fleets in the Azores and Madiera Archipelagoes and the Mediterranean Sea will have a significant, adverse effect on the annual survival rates of juvenile loggerhead sea turtles from the western Atlantic subpopulations, with a disproportionately large effect on the northern subpopulation that may be significant at the population level.

In waters off coastal U.S., a suite of fisheries in Federal and State waters threatens the survival of juvenile loggerhead sea turtles. Loggerhead turtles are captured, injured, or killed in shrimp fisheries off the Atlantic coast; along the southeastern Atlantic coast, loggerhead turtle populations are declining where shrimp fishing is intense off the nesting beaches (NRC 1990). Conversely these nesting populations do not appear to be declining where nearshore shrimping effort is low or absent. The management of shrimp harvest in the Gulf of Mexico demonstrates the correlation between shrimp trawling and impacts to sea turtles. Waters out to 200nm are closed to shrimp fishing off of Texas each year for approximately a three-month period (mid-May through mid-July) to allow shrimp to migrate out of estuarine waters; sea turtle strandings decline dramatically during this period (NMFS, STSSN unpublished data). Loggerhead sea turtles are captured in fixed pound-net gear in the Long Island Sound, in pound-net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, in gill net fisheries in the mid-Atlantic and elsewhere, in fisheries for monkfish and for spiny dogfish, and in northeast sink gillnet fisheries (see further discussion in the *Environmental Baseline* of this Opinion). Witzell (1999) compiled data on capture rates of loggerhead and leatherback turtles in U.S. longline fisheries in the Caribbean and northwest Atlantic; the cumulative takes of these fisheries approach those of the U.S. shrimp fishing fleet (Crouse 1999, NRC 1990).

Based on the data available, it is not possible to estimate the size of the loggerhead population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females, but it may not reflect overall population growth rates. Given this, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,016-89,034 annually, representing, on average, an adult female population of 44,780 [(nests/4.1) * 2.5]. On average, 90.7% of the nests were from the South Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle subpopulation. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation they belong. Based on the above, there are only an estimated 3,800 nesting females in the northern loggerhead subpopulation. The status of this population, based on number of loggerhead nests, has been classified as stable or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NMFS scientists estimate, using genetic data from Texas, South Carolina, and North Carolina in combination with juvenile sex ratios from those states, that the northern subpopulation produces 65% males, while the Florida subpopulation is estimated to produce 80% females (NMFS SEFSC 2001, Part I).

Critical Habitat. No critical habitat has been designated for loggerhead turtles.

Leatherback Turtle

Distribution. The leatherback is the largest living turtle. Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972).

Leatherback turtles undertake the longest migrations of any other sea turtle and exhibit the broadest thermal tolerances (NMFS and USFWS 1998). Leatherback turtles are able to inhabit intensely cold waters for a prolonged period of time because leatherbacks are able to maintain body temperatures several degrees above ambient temperatures. Leatherback turtles are typically associated with continental shelf habitats and pelagic environments, and are sighted regularly in offshore waters (>328 ft). Leatherback turtles regularly occur in deep waters (>328 ft), and an aerial survey study in the north Atlantic Ocean sighted leatherback turtles in water depths ranging from 3 to 13,618 ft, with a median sighting depth of 131.6 ft (CeTAP 1982). This same study found leatherbacks in waters ranging from 7 to 27.2°C.

Natural History. Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996).

Leatherback sea turtles are predominantly distributed pelagically where they feed on jellyfish such as *Stomolophus, Chryaora,* and *Aurelia* (Rebel 1974). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m, but they may come into shallow waters if there is an abundance of jellyfish nearshore. They also occur annually in places such as Cape Cod and Narragansett bays during certain times of the year, particularly the fall.

Status and Threats. The leatherback was listed as endangered on June 2, 1970 and a recovery plan was issued in 1998. Leatherback turtles are included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which effectively bans trade.

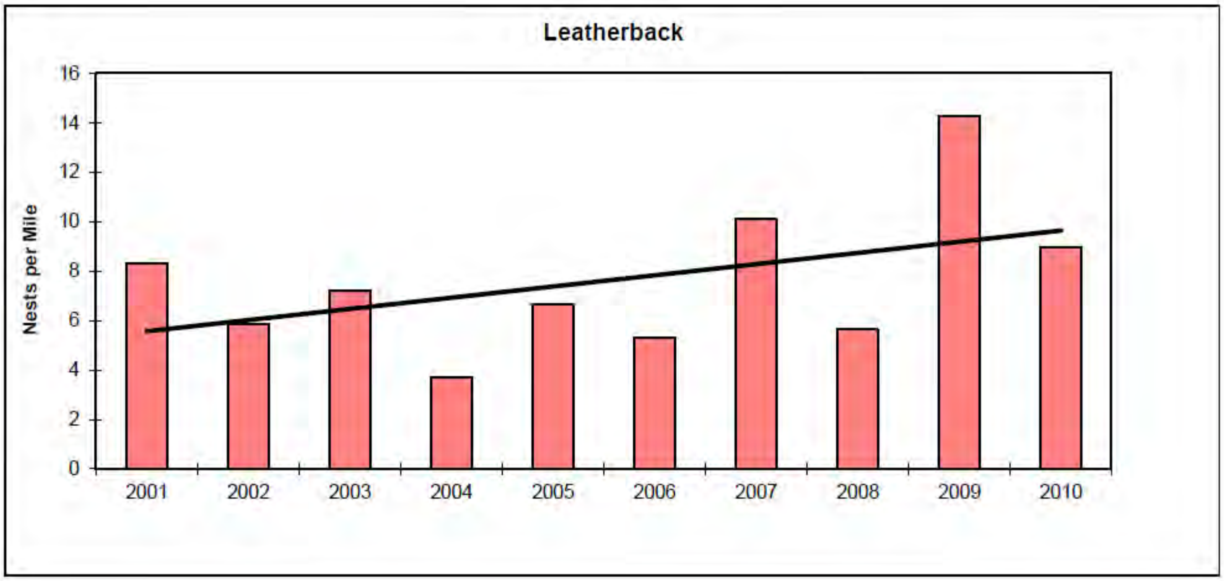
Globally, leatherback turtle populations have been decimated worldwide. The global leatherback turtle population was estimated to number approximately 115,000 adult females in 1980 (Pritchard 1982), but only 34,500 in 1995 (Spotila *et al*. 1996). The decline can be attributed to many factors including fisheries as well as intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila *et al*. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries.

The status of the Atlantic population is not clear. In 1996, it was reported to be stable, at best (Spotila 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers. com.), the Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e. off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila *et al*. in 1996. Between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5%, but that the overall nesting population grew (McDonald, et. al 1993). This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Characterizations of this population suggest that it has a very low likelihood of survival and recovery in the wild under current conditions.

Spotila *et al*. (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species= natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e. egg, hatchling, and juvenile) remained static, stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing.

The primary threats to leatherback turtles are entanglement in fishing gear (e.g., gillnets, longlines, lobster pots, weirs), boat collisions, and ingestion of marine debris (NMFS and USFWS 1997). The foremost threat is the number of leatherback turtles killed or injured in fisheries. Spotila (2000) states that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990s is 1,500 animals. He estimates that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population). As noted above, leatherbacks normally live at least 30 years, usually maturing at about 12-13 years. Such long-lived species cannot withstand such high rates of anthropogenic mortality.

Table 3: Summary of Leatherback (*Dermochelys coriacea*) Nesting in Palm Beach County, 2001-2010



Critical Habitat. NMFS and FWS designated certain areas of the US Virgin Islands as critical habitat for the leatherback turtle. The action area does not comprise designated critical habitat for the species.

Hawksbill Turtle
Distribution. Hawksbill turtles occur in tropical and subtropical waters of the Atlantic, Pacific, and Indian Oceans. Recognized subspecies occupy the Atlantic Ocean (ssp. *imbricata*) and the Pacific Ocean (ssp. *squamata*). Richardson *et al*. (1989) estimated that the Caribbean and Atlantic portions of the U.S. support a minimum of 650 hawksbill turtle nests each year. In the United States, hawksbill turtles have been recorded in all states along the Gulf of Mexico and along the Atlantic coast from Florida to Massachusetts. United States populations nest primarily in the U.S. Virgin Islands and Puerto Rico, but occasionally on the Atlantic coast of Florida. Two hawksbill turtle carcasses have been found in the vicinity of the action area (Wendy Teas, pers com, 2002, NMFS - SEFSC Miami Laboratory).

Natural History. Hawksbill turtles use different habitats for different stages in their life cycles. Post-hatchling hawksbill turtles remain in pelagic environments to take shelter in weedlines that accumulate at convergence points. Juvenile hawksbill turtles (those with carapace lengths of 20-25 cm) re-enter coastal waters where they become residents of coral reefs, which provide sponges for food and ledges, and caves for shelter. Hawksbill turtles are also found around rocky outcrops, high-energy shoals, and mangrove-fringed bays and estuaries (particularly in areas where coral reefs do not occur). Hawksbill turtles remain in coastal waters when they become subadults and adults.

Status and Threats. The hawksbill turtle was listed as an endangered species on June 2, 1970 (35 FR 8491). Populations are threatened by significant modifications of its coastal habitat throughout its range. The National Research Council (1990), and NMFS/FWS (1993) have published general overviews of the effects of habitat alteration on hawksbill turtles. In the U.S. Virgin Islands, problems such as egg poaching, domestic animals, beach driving, litter, and recreational use of beaches have presented problems for nesting hawksbill turtles. In addition, beachfront lights appear to pose a serious problem for hatchling hawksbill (and other) turtles in the U.S. Virgin Islands. At sea, activities that damage coral reefs and other habitats that are important to the hawksbill turtle threaten the continued existence of this species. Hawksbill turtles are also threatened by stochastic events (e.g., hurricanes); predation by fire ants, raccoons and opossums; and by poaching of eggs and nesting females by humans.

Critical Habitat. In 1998, NMFS designated the waters surrounding Mona and Monito Islands, Puerto Rico as critical habitat for the hawksbill turtle. The action area does not comprise designated critical habitat for the species.

Kemp's Ridley Sea Turtle

Status and Population Trends. Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempi*) (USFWS and NMFS 1992) contains a description of the natural history, taxonomy, and distribution of the Kemp's ridley turtle. Kemp's ridleys nest in daytime aggregations known as *arribadas*. The primary arribada in the Gulf of Mexico is at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970's, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing.

After unprecedented numbers of Kemp's ridley carcasses were reported from Texas and Louisiana beaches during periods of high levels of shrimping effort, NMFS established a team of population biologists, sea turtle scientists, and managers, known as the Turtle Expert Working Group (TEWG) to conduct a status assessment of sea turtle populations. Analyses conducted by the group have indicated that the Kemp's ridley population is in the early stages of recovery; however, strandings in some years have increased at rates higher than the rate of increase in the Kemp's population (TEWG 1998).

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the U.S. Fish and Wildlife Service (FWS) and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of turtle excluder devices (TEDs). Adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in 1985, to greater than 3,000 adults producing 1,940 nests in 1995 and about 3,400 nests in 1999.

The TEWG (1998) was unable to estimate the total population size and current mortality rates for the Kemp’s ridley population. However, the TEWG listed a number of preliminary conclusions. The TEWG indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Over the period 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that would continue with enhanced hatchling production and the use of TEDs. Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985. This trajectory of adult abundance tracks with trends in nest abundance from an estimate of 9,600 in 1966 to 1,050 in 1985. The TEWG estimated that in 1995 there were 3,000 adult ridleys. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The population model in the TEWG projected that Kemp’s ridleys could reach the intermediate recovery goal identified in the Recovery Plan of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. It determined that the data reviewed suggested that adult Kemp's ridley turtles were restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic.

The TEWG (1998) identified an average Kemp’s ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular inter-nesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

Hurricane Gilbert expanded the area surveyed for ridley nests in Mexico in 1990 due to destruction of the primary nesting beach. The TEWG (1998) assumed that the increased nesting observed particularly since 1990 was a true increase, rather than the result of expanded beach coverage. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. As noted by TEWG, trends in Kemp’s ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp’s Ridley Recovery Plan.

Natural History. Juvenile Kemp’s ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Post-pelagic ridleys feed primarily on crabs, consuming a variety of species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal, 1997). Juvenile ridleys migrate south as water temperatures cool in fall, and are predominantly found in shallow coastal embayments along the Gulf Coast during fall and winter months. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 centimeters in carapace length, and weighing less than 20 kilograms (Klinger and Musick 1995). Next to loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June, and migrating to more southerly waters from September to November (Keinath *et al.*, 1987; Musick and Limpus, 1997). In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick, 1985; Bellmund *et al.*, 1987; Keinath *et al.*, 1987; Musick and Limpus, 1997). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus, 1997).

Research being conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and 1993, Galveston NMFS Laboratory staff tracked 50 of these turtles using satellite and radio telemetry. The tracking study was designed to characterize sea turtle habitat and to identify small and large-scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.).

Threats. Observations in the northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. As with loggerheads, a large number of Kemp's ridleys are taken in the southeast shrimp fishery each year. Kemp's ridleys were also affected by the apparent large-mesh gillnet interaction that occurred in spring off of North Carolina. A total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. This is expected to be a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all carcasses washed ashore. Stranding events illustrate the vulnerability of Kemp's ridley and loggerhead turtles to the impacts of human activities in nearshore Gulf of Mexico waters as well (TEWG 1998). While many of the stranded turtles observed in recent years in Texas and Louisiana have been incidentally taken in the shrimp fishery, other sources of mortality, such as those observed in the northeastern and southeastern Atlantic zones, exist in these waters.

Critical Habitat. No critical habitat has been designated for the Kemp's ridley turtle.

Smalltooth Sawfish

All modern sawfish belong to the Suborder Pristoidea, Family Pristidae, and Genus *Pristis*. Although they are rays, sawfish appear to be more shark-like than ray-like, with only the trunk and especially the head ventrally flattened. The snout of all sawfish is extended as a long narrow flattened rostral blade with a series of transverse teeth along either edge, hence the vernacular name. Species in the genus *Pristis* are separable into two groups according to whether the caudal fin has a distinct lower lobe or not. The smalltooth sawfish, *Pristis pectinata*, is the sole known representative on the western side of the Atlantic of the group lacking a defined lower caudal lobe (NMFS, 2000).

Distribution. The smalltooth sawfish has a circumtropical distribution and has been reported from shallow coastal and estuarine habitats. In U.S. waters, *P. pectinata* historically occurred from North Carolina south through the Gulf of Mexico, where it was sympatric with the largetooth sawfish (west and south of Port Arthur, TX) (Adams and Wilson, 1995. It also was an occasional visitor to waters as far north as New York. As with all sawfishes, it is euryhaline, occurring in fresh water, nearshore estuaries and in coastal waters to depths of 25 meters.

Pristis pectinata is the largest of the sawfishes, reported to reach 760 cm while more commonly growing to 550 cm (Last and Stevens 1994). Bigelow and Schroeder (1953) reported litter size of 15-20 embryos. Overall, life history parameters for this species are largely unknown.

Smalltooth sawfish were once common in Florida as detailed by the Final Smalltooth Sawfish Recovery Plan (NMFS, 2009) and are very rarely reported in southeast Florida. Their core range extends along the Everglades coast from the Ten Thousand Islands to Florida Bay, with moderate occurrence in the Florida Keys and at the mouth of the Caloosahatchee River. Outside of these areas, sawfish are rarely encountered and appear to be relatively rare (Simpfendorfer, 2006). It does not appear to be a coincidence that the core range of smalltooth sawfish corresponds to the section of Florida with the smallest amount of coastal habitat modification.

In the United States, smalltooth sawfish are generally a shallow water fish of inshore bars, mangrove edges, and seagrass beds, but are occasionally found in deeper coastal waters. Records indicate that smalltooth sawfish have been found in the lower reaches of the St. Johns River and the Indian River lagoonal system. Individuals have also historically been reported to migrate northward along the Atlantic seaboard in the warmer months.

Updated collection records from the Florida Museum of Natural History of the University of Florida include 13 records of *P. pectinata* from 1912 to 1998 (with one record not dated). Nine of these specimens were recorded from the Gulf of Mexico off Florida, three came from the Atlantic side of Florida, and one animal was caught in Pacific waters off Ecuador. Three additional records of smalltooth sawfish from the Atlantic coast of Florida have yet to be cataloged in this collection: one specimen is from 1979; the second is not dated (the Museum received both these fish from the Harbor Branch Oceanographic Institute); a third specimen was landed May 22, 1998 from the Indian River (Burgess, pers. comm.). There are eight reports of smalltooth sawfish along the Florida east coast in the 1990's, most from coastal rather than lagoonal areas.

General Human-related impacts. The principal habitats for smalltooth sawfish in the southeast U.S. are the shallow coastal areas and estuaries, with some specimens moving upriver in freshwater (Bigelow and Schroeder, 1953). The continued urbanization of the southeastern coastal states has resulted in substantial loss of coastal habitat through such activities as agricultural and urban development; commercial activities; dredge and fill operations; boating; erosion and diversions of freshwater run-off (SAFMC, 1998). Smalltooth sawfish may be especially vulnerable to coastal habitat degradation due to their affinity to shallow, estuarine systems. With the K-selected life history strategy of smalltooth sawfish, including slow growth, late maturation, and low fecundity, long-term commitments to habitat protection are necessary for the eventual recovery of the species.

A complete review of the factors contributing to the decline of the smalltooth sawfish can be found in the "Status Review of Smalltooth Sawfish (*Pristis pectinata*)", (NMFS, 2000) and will not be repeated in detail here.

Status and Trends. The smalltooth sawfish was added to the list of species as candidates under the ESA in 1991, removed in 1997, and placed back on the list again in 1999. In November 1999, NMFS received a petition from the Center of Marine Conservation requesting that this species be listed as endangered under the ESA. NMFS completed a status review for smalltooth sawfish in December 2000, and published a proposed rule to list this the U.S. population of this species as endangered under the ESA on April 16, 2001. On April 1, 2003, the National Marine Fisheries Service (NOAA Fisheries) announced its final determination to list smalltooth sawfish as an endangered species under the Endangered Species Act (ESA).

According to NMFS (2000) "The U.S. DPS of smalltooth sawfish has experienced a ninety percent curtailment of its range and severe declines in abundance. Agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater run-off have resulted in the destruction and modification of smalltooth habitat throughout the southeastern U.S. Although habitat degradation is not likely the primary reason for the decline of smalltooth sawfish abundance and their contracted distribution, it has likely been a contributing factor. Over 50% of the U.S. human population lives within fifty miles of the ocean or Great Lakes. Migration to the coastlines for home, livelihood or recreation is predicted to increase by the year 2010 (National Ocean Service, 2000). Increases in coastal human populations will likely result in additional losses of marine habitats and increased pollution, further threatening the survival of smalltooth sawfish."

Simpfendorfer (2000) used a demographic approach to estimate intrinsic rate of natural increase and population doubling time. Since there are very limited life history data for smalltooth sawfish, much of the data (e.g. reproductive periodicity, longevity and age-at-maturity) were inferred from the more well-known largetooth sawfish. The litter size of smalltooth sawfish in the literature is given as 15 – 20 and Simpfendorfer used a mean of 17.5. However, the data on which this litter size is based are somewhat dubious. To account for uncertainty in the life-history parameters several different scenarios were tested, covering longevities from 30 to 70 years and ages-at-maturity from 10 to 27 years. The results indicated that the intrinsic rate of population increase ranged from 0.08/year to 0.13/ year, and population-doubling times ranged from 5.4 years to 8.5 years. These models assume the literature value for litter size is correct; doubling times would be longer if litter sizes are more in the range observed for largetooth sawfish (1 to 13, with a mean of 7.3). Simpfendorfer concluded:

> The estimated population doubling times for smalltooth sawfish indicate that the recovery times for this population will be very long. There are no data available on the size of the remaining populations, but anecdotal information indicates that smalltooth sawfish survive today in small fragmented areas where the impact of humans, particularly from net fishing, has been less severe. Fragmenting of the population will increase the time that it takes for recovery since the demographic models used in the study above assume a

single inter-breeding population. The genetic effects of recovery from very small population sizes may also impact conservation efforts. It is likely that even if an effective conservation plan can be introduced in the near future, recovery to a level where the risk of extinction is low will take decades, while recovery to pre-European settlement levels would probably take several centuries.

Humpback Whale

Species description and distribution. Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. Humpback whales feed on krill and small schooling fish on their summer grounds. The whales occupy tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding, primarily on small schooling fish and krill (Caldwell and Caldwell 1983).

In the Atlantic Ocean, humpback whales feed in the northwestern Atlantic during the summer months and migrate to calving and mating areas in the Caribbean. Six separate feeding areas are utilized in northern waters after their return. This area will not be affected because it is within the biologically important area defined by the 200-m (656-ft) isobath on the North American east coast. Humpback whales also use the mid-Atlantic as a migratory pathway and apparently as a feeding area, at least for juveniles. Since 1989, observations of juvenile humpbacks in that area have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists theorize that non-reproductive animals may be establishing a winter-feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for the associated prey. Humpback whales have also been observed feeding on krill.

Life History. Humpback whale reproductive activities occur primarily in winter. They become sexually mature at age four to six. Annual pregnancy rates have been estimated at about 0.40-0.42 (NMFS unpublished and Nishiwaki 1959). Cows will nurse their calves for up to 12 months. The age distribution of the humpback whale population is unknown, but the portion of calves in various populations has been estimated at about 4B12% (Chittleborough 1965, Whitehead 1982, Bauer 1986, Herman *et al.* 1980, and Clapham and Mayo 1987).

The information available does not identify natural causes of death among humpback whales or their number and frequency over time, but potential causes of natural mortality are believed to include parasites, disease, predation (killer whales, false killer whales, and sharks), biotoxins, and entrapment in ice.

Humpback whales exhibit a wide range of foraging behaviors, and feed on a range of prey types including small schooling fishes, euphausiids, and other large zooplankton. Fish prey in the North Pacific include herring, anchovy, capelin, pollack, Atka mackerel, eulachon, sand lance, pollack, Pacific cod, saffron cod, arctic cod, juvenile salmon, and rockfish. In the waters west of the Attu Islands and south of Amchitka Island, Atka mackerel were preferred prey of humpback whales (Nemoto 1957). Invertebrate prey includes euphausiids, mysids, amphipods, shrimps, and copepods.

Diving and social behavior. In Hawaiian waters, humpback whales remain almost exclusively within the 1820 m isobath and usually within 182 m. Maximum diving depths are approximately 150 m (492 ft) (but usually <60 m [197 ft]), with a very deep dive (240 m [787 ft]) recorded off Bermuda (Hamilton *et al.* 1997). They may remain submerged for up to 21 min (Dolphin 1987). Dives on feeding grounds ranged from 2.1-5.1 min in the north Atlantic (Goodyear unpubl. manus.). In southeast Alaska average dive times were 2.8 min for feeding whales, 3.0min for non-feeding whales, and 4.3 min for resting whales (Dolphin 1987). In the Gulf of California humpback whale dive times averaged 3.5 min (Strong 1989). Because most humpback prey is likely found above 300 m depths most humpback dives are probably relatively shallow.

Clapham (1986) reviewed the social behavior of humpback whales. They form small stable groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of times. There is good evidence of some territoriality on feeding grounds (Clapham 1994, 1996), and on wintering ground (Tyack 1981). On the breeding grounds males sing long complex songs directed towards females, other males or both. The breeding season can best be described as a floating lek or male dominance polygyny (Clapham 1996). Intermale competition for proximity to females can be intense as expected by the sex ratio on the breeding grounds that may be as high as 2.4:1.

Vocalizations and hearing. Humpbacks produce a wide variety of sounds. During the breeding season males sing long, complex songs, with frequencies in the 25-5000 Hz range and intensities as high as 181 dB (Payne 1970; Winn *et al.* 1970a; Thompson *et al.* 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson *et al.* 1979). The songs appear to have an effective range of approximately six to 12 miles (10 to 20 km). Animals in mating groups produce a variety of sounds (Tyack 1981; Tyack and Whitehead 1983, Silber 1986). Sounds are produced less frequently on the summer feeding grounds. Feeding groups produce distinctive sounds ranging from 20 Hz to 2 kHz, with median durations of 0.2-0.8 sec and source levels of 175-192 dB (Thompson *et al.* 1986). These sounds are attractive and appear to rally animals to the feeding activity (D=Vincent *et al.* 1985; Sharpe and Dill 1997). In summary, humpback whales produce at least three kinds of sounds: 1) complex songs with components ranging from at least 20Hz B 4 kHz with estimated source levels from 144 B 174 dB, which are mostly sung by males on the breeding grounds (Payne 1970; Winn *et al.* 1970a; Richardson *et al.* 1995); 2) social sounds in the breeding areas that extend from 50Hz B more than 10 kHz with most energy below 3kHz (Tyack and Whitehead 1983, Richardson *et al.* 1995); and 3) Feeding area vocalizations that are less frequent, but tend to be 20Hz B 2 kHz with estimated sources levels in excess of 175 dB re 1 µPa-m (Thompson *et al.* 1986; Richardson *et al.* 1995). Sounds often associated with possible aggressive behavior by males (Tyack 1983; Silber 1986) are quite different from songs, extending from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz. These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead 1983). A general description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. Humpback whales respond to low frequency sound. Humpback whales have been known to react to low frequency industrial noises at estimated received levels of 115 B 124 dB (Malme *et al.* 1985), and to conspecific calls at received levels as low as 102dB (Frankel *et al.* 1995). Humpback whales apparently reacted to 3.1 B 3.6 kHz sonar by changing behavior (Maybaum 1990 1993). Malme *et al.* (1985) found no clear response to playbacks of drill ship and oil production platform noises at received levels up to 116dB re 1 µPa. Studies of reactions to airgun noises were inconclusive (Malme *et al.* 1985). Humpback whales on the breeding grounds did not stop singing in response to underwater explosions (Payne and McVay 1971). Humpback whales on feeding grounds did not alter short-term behavior or distribution in response to explosions with received levels of about 150dB re 1 µPa/Hz at 350Hz (Lien *et al.* 1993; Todd *et al.* 1996). However, at least two individuals were likely killed by the high intensity, impulsed blasts and had extensive mechanical injuries in their ears (Ketten *et al.* 1993; Todd *et al.* 1996). The explosions may also have increased the number of humpback whales entangled in fishing nets (Todd *et al.* 1996). Frankel and Clark (1998) showed that breeding humpbacks showed only a slight statistical reaction to playback of 60 B 90 Hz bounds with a received level of up to 190 dB. While these studies have shown short-term behavioral reactions to boat traffic and playbacks of industrial noise, the potential for habituation, and thus the long term effects of these disturbances are not known.

Status and Trends. Humpback whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA. Critical habitat has not been designated for the species.

New information has become available on the status and trends of the humpback whale population in the North Atlantic (NMFS, 2001). Although current and maximum net productivity rates are unknown at this time, the population is apparently increasing. It has not yet been determined whether this increase is uniform across all six feeding stocks (Waring *et al. in prep.*). Katona and Beard (1990) estimated the rate of increase at 9.0 percent, while Barlow and Clapham (1997) reported a 6.5 percent rate for the Gulf of Maine using data through 1991. The rate reported by Barlow and Clapham (1997) may roughly approximate the rate of increase for the portion of the population within the action area. The best estimate of abundance for the North Atlantic humpback whale population is 10,600 animals (CV=0.067; Smith *et al.* 1999), while the minimum population estimate used for NMFS management purposes is 10,019 animals (CV = 0.067; Waring *et al. in prep.*). The Northeast Fisheries Science Center is considering recommending that NMFS identify the Gulf of Maine feeding stock as the management stock for this population in U.S. waters. A population estimate for the Gulf of Maine portion of the population is not available.

Threats. In the 1990s, no more than 3 humpback whales were killed annually in U.S. waters by commercial fishing operations in the Atlantic and Pacific Oceans. Between 1990 and 1997, no humpback whale deaths have been attributed to interactions with groundfish trawl, longline and pot fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska (Hill and DeMaster 1999). Humpback whales have been injured or killed elsewhere along the mainland U.S. and Hawaii (Barlow *et al.* 1997). In 1991, a humpback whale was observed entangled in longline gear and released alive (Hill *et al.* 1997). In 1995, a humpback whale in Maui waters was found trailing numerous lines (not fishery-related) and entangled in mooring lines. The whale was successfully released, but subsequently stranded and was attacked and killed by tiger sharks in the surf zone.

Humpback whales seem to respond to moving sound sources, such as whale-watching vessels, fishing vessels, recreational vessels, and low-flying aircraft (Beach and Weinrich 1989, Clapham *et al.* 1993, Atkins and Swartz 1989). Their responses to noise are variable and have been correlated with the size, composition, and behavior of the whales when the noises occurred (Herman *et al.* 1980, Watkins *et al.* 1981, Krieger and Wing 1986). Several investigators have suggested that noise may have caused humpback whales to avoid or leave feeding or nursery areas (Jurasz and Jurasz 1979b, Dean *et al.* 1985), while others have suggested that humpback whales may become habituated to vessel traffic and its associated noise. Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle *et al.* 1993; Wiley *et al.* 1995).

Many humpback whales are killed by ship strikes along both coasts of the U.S. On the Atlantic coast, 6 out of 20 humpback whales stranded along the mid-Atlantic coast showed signs of major ship strike injuries (Wiley *et al.* 1995). Almost no information is available on the number of humpback whales killed or seriously injured by ship strikes outside of U.S. waters.

Sperm Whale

Species description and distribution. Sperm whales are distributed in the entire world's oceans. Sperm whales have a strong preference for the 3,280 ft (1,000 m) depth contour and seaward. Berzin (1971) reported that they are restricted to waters deeper than 300 m (984 ft), while Watkins (1977) and Reeves and Whitehead (1997) reported that they are usually not found in waters less than 3,281 ft (1,000m) deep. While deep water is their typical habitat, sperm whales have been observed near Long Island, NY, in waters of 41-55 m (135-180 ft) (Scott and Sadove 1997). When found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling occurs and biological production is high, implying the presence of a good food supply (Clarke 1956). They can dive to depths of at least 2000 m (6562 ft), and may remain submerged for an hour or more (Watkins *et al.* 1993). Sperm whales feed primarily on buoyant, relatively slow-moving squid (Clark *et al.* 1993), but may also eat a variety of fish, including salmon (*Oncorhynchus* spp.), rockfish (*Sebastes* spp.), and lingcod (*Ophiodon elongatus*) (Caldwell and Caldwell 1983).

In the Atlantic Ocean, NMFS' most recent stock assessment report notes that sperm whales are distributed in a distinct seasonal cycle, concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight. There is also a very large population of sperm whales found in the Gulf of Mexico near the Mississippi River delta.

Life History. Female sperm whales take about 9 years to become sexually mature (Kasuya 1991, as cited in Perry *et al.* 1999). Male sperm whales take between 9 and 20 years to become sexually mature, but will require another 10 years to become large enough to successfully compete for breeding rights (Kasuya 1991). Adult females give birth after about 15 months gestation and nurse their calves for 2 - 3 years. The calving interval is estimated to be about four to six years (Kasuya 1991). The age distribution of the sperm whale population is unknown, but sperm whales are believed to live at least 60 years (Rice 1978). Estimated annual mortality rates of sperm whales are thought to vary by age, but previous estimates of mortality rate for juveniles and adults are now considered unreliable (IWC 1980, as cited in Perry *et al.* 1999). Sperm whales are known for their deep foraging dives (in excess of 3 km). They feed primarily on mesopelagic squid, but also consume octopus, other invertebrates, and fish (Tomilin 1967, Tarasevich1968, Berzin 1971). Perez (1990) estimated that their diet in the Bering Sea was 82% cephalopods (mostly squid) and 18% fish. Fish eaten in the North Pacific included salmon, lantern fishes, lancetfish, Pacific cod, pollack, saffron cod, rockfishes, sablefish, Atka mackerel, sculpins, lumpsuckers, lamprey, skates, and rattails (Tomilin 1967, Kawakami 1980, Rice 1986b). Sperm whales taken in the Gulf of Alaska in the 1960s had fed primarily on fish. Daily food consumption rates for sperm whales ranges from 2 - 4% of their total body weight (Lockyer 1976b, Kawakami 1980). Potential sources of natural mortality in sperm whales include killer whales and papilloma virus (Lambertson *et al.* 1987).

Diving and social behavior. Sperm whales are likely the deepest and longest diving mammals. Typical foraging dives last 40 min and descend to about 400m followed by approximately 8 min of resting at the surface (Gordon 1987; Papastavrou et al. 1989). However, dives of over 2 hr and as deep as 3,000 m have been recorded (Clarke 1976; Watkins et al. 1985). Descent rates recorded from echosounders were approximately 1.7m/sec and nearly vertical (Goold and Jones 1995). There are no data on diurnal differences in dive depths in sperm whales. However, like most diving vertebrates for which there is data (e.g. rorqual whales, fur seals, chinstrap penguins), sperm whales probably make relatively shallow dives at night when organisms from the ocean's deep scattering layers move toward the ocean's surface.

The groups of closely related females and their offspring develop dialects specific to the group (Weilgart and Whitehead 1997) and females other than birth mothers will guard young at the surface (Whitehead 1996b) and will nurse young calves (Reeves and Whitehead 1997).

Vocalizations and hearing. Sperm whales produce loud broadband clicks from about 0.1 to 20 kHz (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). These have source levels estimated at 171 dB re 1 µPa (Levenson 1974). Current evidence suggests that the disproportionately large head of the sperm whale is an adaptation to produce these vocalizations (Norris and Harvey 1972; Cranford 1992; but see Clarke 1979). This suggests that the production of these loud low frequency clicks is extremely important to the survival of individual sperm whales. The function of these vocalizations is relatively well studied (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). Long series of monotonous regularly spaced clicks are associated with feeding and are thought to be produced for echolocation. Distinctive, short, patterned series of clicks, called codas, are associated with social behavior and intragroup interactions; they are thought to facilitate intra-specific communication, perhaps to maintain social cohesion with the group (Weilgart and Whitehead 1993).

A general description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. The only data on the hearing range of sperm whales are evoked potentials from a stranded neonate (Carder and Ridgway 1990). These data suggest that neonatal sperm whales respond to sounds from 2.5-60 kHz. Sperm whales have been observed to frequently stop echolocating in the presence of underwater pulses made by echosounders and submarine sonar (Watkins and Schevill 1975; Watkins *et al.* 1985). They also stop vocalizing for brief periods when codas are being produced by other individuals, perhaps because they can hear better when not vocalizing themselves (Goold and Jones 1995). Sperm whales have moved out of areas after the start of air gun seismic testing (Davis *et al.* 1995). Seismic air guns produce loud, broadband, impulsive noise (source levels are on the order of 250 dB) with shots at every 15 seconds, 240 shots per hour, and 24 hours per day during active tests. Because they spend large amounts of time at depth and use low frequency sound sperm whales are likely to be susceptible to low frequency sound in the ocean (Croll *et al* 1999). Furthermore, because of their apparent role as important predators of mesopelagic squid and fish, changes in their abundance could affect the distribution and abundance of other marine species.

Status and Trends. Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). Sperm whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA. Critical habitat has not been designated for sperm whales.

The best abundance estimate that is currently available for the western North Atlantic sperm whale population is 2,698 (CV=0.67) animals, and the minimum population estimate used for NMFS management purposes is 1,617 (CV=0.67) (Waring *et al. in prep.*). Due to insufficient data, no information is available on population trends at this time for the western North Atlantic sperm whale stock.

Threats. In U.S. waters in the Pacific, sperm whales are known to have been incidentally taken only in drift gillnet operations, which killed or seriously injured an average of 9 sperm whales per year from 1991-1995 (Barlow *et al.* 1997). Interactions between longline fisheries and sperm whales in the Gulf of Alaska have been reported over the past decade (Rice 1989, Hill and DeMaster 1999). Observers aboard Alaskan sablefish and halibut longline vessels have documented sperm whales feeding on fish caught in longlines in the Gulf of Alaska. During 1997, the first entanglement of a sperm whale in Alaska's longline fishery was recorded, although the animal was not seriously injured (Hill and DeMaster 1998). The available evidence does not indicate sperm whales are being killed or seriously injured as a result of these interactions, although the nature and extent of interactions between sperm whales and long-line gear is not yet clear.

Johnson's Seagrass

Species Description. Johnson's seagrass was listed as threatened under the ESA on September 14, 1998 based on the results of fieldwork and a status review initiated in 1990 and is the first marine plant ever listed. Kenworthy (1993, 1997, 1999) discusses the results of the field studies and summarizes an extensive literature review and associated interviews regarding the status of Johnson's seagrass.

The species has only been found growing along approximately 200 km of coastline in southeastern Florida from Sebastian Inlet, Indian River County to northern Key Biscayne. This narrow range and apparent endemism indicates that Johnson's seagrass has the most limited geographic distribution of any seagrass in the world.

Johnson's seagrass occurs in dynamic and disjunct patches throughout its range. Growth appears to be rapid and leaf pairs have short life spans while horizontally spreading from dense apical meristems (Kenworthy 1997). Kenworthy suggested that horizontal spreading rapid growth pattern and a high biomass turnover could explain the dynamic patches observed in distribution studies. New information reviewed in Kenworthy (1999, 1997) confirms *H. johnsonii's* limited geographic distribution in patchy and vertically disjunct areas between Sebastian Inlet and northern Biscayne Bay. Surveys conducted by NMFS and Florida staff in Biscayne Bay, Florida Bay, the Florida Keys, outer Florida Bay, Puerto Rico, and the Virgin Islands provided no verifiable sightings of Johnson's seagrass outside of the range already reported.

Extent of critical habitat. The northern and southern ranges of Johnson's seagrass are defined as Sebastian Inlet and central Biscayne Bay, respectively. These limits to the species' range have been designated as critical habitat for Johnson's seagrass. Within its range, Johnson's seagrass critical habitat designations have been designated for 10 areas: a portion of the Indian River Lagoon, north of the Sebastian Inlet Channel; a portion of the Indian River Lagoon, south of the Sebastian Inlet Channel; a portion of the Indian River Lagoon near the Fort Pierce Inlet; a portion of the Indian River Lagoon, north of the St. Lucie Inlet; a portion of Hobe Sound; a site on the south side of Jupiter Inlet; a site in central Lake Worth Lagoon; a site in Lake Worth Lagoon, Boynton Beach; a site in Lake Wyman, Boca Raton; and a portion of Biscayne Bay. There is no designated critical habitat within the action area.

Life History

Reproductive strategy

The species is perennial and may spread even during winter months under favorable conditions (Virnstein *et al.* 1997). Sexual reproduction in Johnson's seagrass has not been documented. Female flowers have been found; however, dedicated surveys in the Indian River Lagoon have not discovered male flowers, fertilized ovaries, fruits, or seeds either in the field or under laboratory conditions (Jewett-Smith *et al.* 1997). Searches throughout the range of Johnson's seagrass have produced the same results, suggesting that the species does not reproduce sexually or that the male flowers are difficult to observer or describe, as noted for other *Halophila* species (Kenworthy 1997). Surveys to date indicate that the incidence of female flowers appears to be much higher near the inlets leading to the Atlantic Ocean, suggesting that inlet conditions are qualitatively better for flowering than conditions further inshore (Kenworthy pers. comm. 1998). It is possible that male flowers, if they exist, occur near inlets as well. Maintenance of good water quality around inlets may be essential for promoting flowering in the Johnson's seagrass population.

Niche

The essential features of habitat appear to be adequate water quality, salinity, water clarity and stable sediments free from physical disturbance. Important habitat characteristics include shallow intertidal as well as deeper subtidal zones (2-5 m). Water transparency appears to be critical for Johnson's seagrass, limiting its distribution at depth to areas of suitable optical water quality (Kenworthy 1997). In areas in which long-term poor water and sediment quality have existed until recently, such as Lake Worth Lagoon, *H. johnsonii* appears to occur in relatively higher abundance perhaps due to the previous inability of the larger species to thrive. These studies support unconfirmed previous observations that suspended solids and tannin, which reduce light penetration and water clarity, may be important factors limiting seagrass distribution. Good water clarity is essential for *Halophila johnsonii* growth in deeper waters.

Johnson's seagrass occurs over varied depths, environmental conditions, salinities, and water quality. In tidal channels *H. johnsonii* is found in coarse sand substrates, although it has been found growing on sandy shoals, in soft mud near canals and rivers where salinity many fluctuate widely (Virnstein *et al.* 1997). Virnstein has called Johnson's seagrass a "perennial opportunistic species." Within his study areas in the Indian River Lagoon, *H. johnsonii* was found by itself, with other seagrass species, in the intertidal, and (more commonly) at the deep edge of some transects in water depths of up to 180 cm. *H. johnsonii* was found shallowly rooted on sandy shoals, in soft mud, near the mouths of canals, rivers and in shallow and deep water (Virnstein *et al.* 1997). Additionally, recent studies have documented large patches of Johnson's seagrass on flood deltas just inside Sebastian Inlet, as well as far from the influence of inlets (reported at the workshop discussed in Kenworthy, 1997). These sites encompass a wide variety of salinities, water quality, and substrates.

<u>Competitors:</u>
Halophila johnsonii appears to be outcompeted in ideal seagrass habitats where environmental conditions permit the larger species to thrive (Virnstein *et al.* 1997, Kenworthy 1997).

Population Dynamics
<u>Population stability</u>
A factor leading to the listing of *H. johnsonii* is its rareness within its extremely restricted geographic range. Johnson's seagrass is characterized by small size (it is the smallest of all of the seagrasses found within its range, averaging about 3 cm in height), fragile rhizome structure and associated high turnover rate, and is apparently reliant on vegetative means to reproduce, grow and migrate across the sea bottom. These factors make Johnson's seagrass extremely vulnerable to human or environmental impacts by reducing its capacity to repopulate an area once removed. The species and its habitat are impacted by human-related activities throughout the length its range, including bridge construction and dredging, and the species' threatened status produces new and unique challenges for the management of shallow submerged lands. Vessel traffic resulting in propeller and anchor damage, maintenance dredging, dock and marine construction, water pollution, and land use practices could require special management within critical habitat.

<u>Population (genetic) variability</u>:
The Boca Raton and Boynton Beach sites proposed for critical habitat designation have populations that are distinguished by a higher index of genetic variation than any of the central and northern populations examined to date (Kenworthy, 1999). These two sites represent a genetically semi-isolated group that could be the reservoir of a large part of the overall genetic variation found in the species. Information is still lacking on the geographic extent of this genetic variability.

Status and Distribution. Kenworthy (1997, 1999) summarized the newest information on Johnson's seagrass biology, distribution, and abundance and confirmed the limited range and rareness of this species within its range. Additionally, the apparent restriction of propagation through vegetative means suggests that colonization between broadly disjunct areas is likely difficult, suggesting that the species is vulnerable to becoming endangered if it is removed from large areas within its range by natural or anthropogenic means. Human impacts to Johnson’s seagrass and its habitat include: (1) Vessel traffic and the resulting propeller dredging and anchor mooring; (2) dredging; (3) dock and marina construction and shading from these structures; (4) water pollution; and (5) land use practices including shoreline development, agriculture, and aquaculture.

Activities associated with recreational boat traffic account for the majority of human use associated with the proposed critical habitat areas. The destruction of the benthic community due to boating activities, propeller dredging, anchor mooring, and dock and marina construction was observed at all sites during a study by NMFS from 1990 to 1992. These activities severely disrupt the benthic habitat, breaching root systems, severing rhizomes, and significantly reducing the viability of the seagrass community. Propeller dredging and anchor mooring in shallow areas are a major disturbance to even the most robust seagrasses. This destruction is expected to worsen with the predicted increase in boating activity. Trampling of seagrass beds, a secondary effect of recreational boating, also disturbs seagrass habitat. Populations of Johnson's seagrass inhabiting shallow water and water close to inlets, where vessel traffic is concentrated, will be most affected.

The constant sedimentation patterns in and around inlets require frequent maintenance dredging, which could either directly remove essential seagrass habitat or indirectly affect it by redistributing sediments, burying plants and destabilizing the bottom structure. Altering benthic topography or burying the plants may remove them from the photic zone. Permitted dredging of channels, basins, and other in- and on-water construction projects cause loss of Johnson’s seagrass and its habitat through direct removal of the plant, fragmentation of habitat, and shading. Docking facilities that, upon meeting certain provisions, are exempt from state permitting also contribute to loss of Johnson’s seagrass through construction impacts and shading. Fixed add-ons to exempt docks (such as finger piers, floating docks, or boat lifts) have recently been documented as an additional source of seagrass loss due to shading (Smith and Mezich, 1999).

Decreased water transparency caused by suspended sediments, water color, and chlorophylls could have significant detrimental effects on the distribution and abundance of the deeper water populations of Johnson's seagrass. A distribution survey in Hobe and Jupiter Sounds indicates that the abundance of this seagrass diminishes in the more turbid interior portion of the lagoon where reduced light limits photosynthesis.

Other areas of concern include seagrass beds located in proximity to rivers and canal mouths where low salinity, highly colored water is discharged. Freshwater discharge into areas adjacent to seagrass beds may provoke physiological stress upon the plants by reducing the salinity levels. Additionally, colored waters released into these areas reduce the amount of sunlight available for photosynthesis by rapidly attenuating shorter wavelengths of Photosynthetically Active Radiation.

Continuing and increasing degradation of water quality due to increased land use and water management threatens the welfare of seagrass communities. Nutrient overenrichment caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural land run-off stimulates increased algal growth that may smother Johnson's seagrass, shade rooted vegetation, and diminish the oxygen content of the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities.

A wide range of activities funded, authorized or carried out by Federal agencies may affect the essential habitat requirements of Johnson's seagrass. These include authorization by the COE for beach nourishment, dredging, and related activities including construction of docks and marinas; bridge construction projects funded by the Federal Highway Administration; actions by the U.S. Environmental Protection Agency and the COE to manage freshwater discharges into waterways; regulation of vessel traffic by the U.S. Coast Guard; management of national refuges and protected species by the U.S. Fish and Wildlife Service; management of vessel traffic (and other activities) by the U.S. Navy; authorization of state coastal zone management plans by NOAA's National Ocean Service, and management of commercial fishing and protected species by NMFS.

<u>Rangewide trend</u>:
Lamentably, there is currently insufficient information to clearly determine trends in the Johnson’s seagrass population, which was described in 1980 and has only been extensively studied during the 1990s. Generally, seagrasses within the range of Johnson’s seagrass have declined in some areas and increased in others. Where multiyear mapping studies have been conducted within the Indian River Lagoon, recent increases in Johnson’s seagrass have been noted but may be attributed in part to the recent increase in search effort and increased familiarity with this species (Virnstein *et al.* 1997). The authors conclude that from 1994 through 1997, no strong seasonal distribution or increases or decreases in abundance or range can be discerned.

<u>Protected Species Surveys within the project area.</u>
Surveys specifically targeting protected species were conducted in the project vicinity for Johnson’s seagrass. There is an Environmental Impact Statement (EIS) being prepared concurrently to satisfy NEPA regulations, which will have additional information covering all potentially impacted species. This assessment, literature reviews and consultations with NMFS serve as the basis for this biological assessment and the determination of which listed and protected species under NMFS’ jurisdiction are found in the project area.

<u>Sea Turtles</u>
Palm Beach County is within the normal nesting range of three species of sea turtles: the loggerhead (*Caretta caretta*), the green turtle (*Chelonia mydas*), and the leatherback (*Dermochelys coriacea*). The green sea turtle and leatherback sea turtle are both listed under the U. S. Endangered Species Act, 1973 and Chapter 370, F.S. The loggerhead turtle is listed as a threatened species (Burney and Margolis, 1999). A summary of sea turtle nesting in Palm Beach County can be found in Tables 1, 2 and 3 in the species description section of this assessment. The waters offshore of Palm Beach County are also habitat used for foraging and shelter for the

three species listed above and possibly the hawksbill turtle (*Eretmochelys imbricata*), and the Kemp's ridley turtle (*Lepidochelys kempii*) (USACE, 2000). Table lists the number of sea turtle nests recorded by Palm Beach County for the beach placement area south of the south jetty (http://www.co.palm-beach.fl.us/erm/permitting/sea-turtles/nesting.htm).

Table 4. Sea Turtle Nesting Data for Beach Placement Area South of the South Jetty.

Year	Loggerhead	Green	Leatherback
2006	155	9	10
2007	99	9	8
2008	161	5	8
2009	136	3	15
2010	289	4	6
Mean	168	6	9.4

Johnson's Seagrass

Johnson's seagrass occurs within the project area, specifically in the areas south of the turning basin and north of the project around Peanut Island. Abundance and density values vary and the species is generally associated with *H. decipiens*. From a 2011 survey, Johnson's seagrass was present in 16 of 28 transects surveyed, with abundance and density estimated using the Braun-Blanquet abundance scale (Table 1).

Table 5. Braun-Blanquet Abundance Scale Values

0	Species absent from quadrat
0.1	Species represented by a solitary short shoot, <5% cover
0.5	Species represented by a few (< 5%) short shoots, <5% cover
1.0	Species represented by many (> 5%) short shoots, <5% cover
2.0	Species represented by many (> 5%) short shoots, 5% - 25% cover
3.0	Species represented by many (> 5%) short shoots, 25%- 50% cover
4.0	Species represented by many (> 5%) short shoots, 50%- 75% cover
5.0	Species represented by many (> 5%) short shoots 75%-100% cover

Abundance values for *H. johnsonii* ranged from 0.1 to 1.38 among transects. The average abundance for *H. johnsonii* was 0.6 (< 5% cover). *H. johnsonii* had the lowest abundance values of all species over all transects. Density for *H. johnsonii* was the highest of all species in the study area, with an average value of 0.17. The range of density values for *H. johnsonii* was 0 to 0.57.

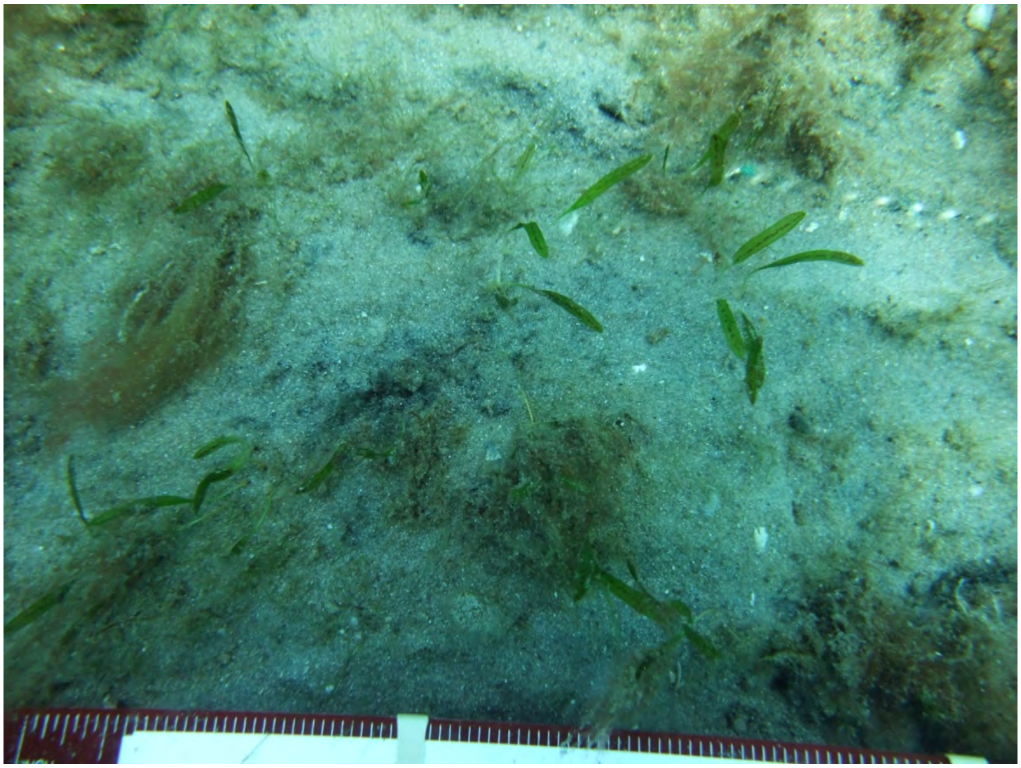


Figure 4. ***Halophila johnsonii*** **(Braun Blanquet score 1 (<5% cover).**

Smalltooth sawfish

This species inhabits softbottom estuarine habitats in depths generally less than 30 feet. Its former range in U.S. waters extended from Texas through Maryland. Currently, few are observed outside peninsular Florida. At least one recorded observation has occurred within the vicinity of Palm Beach County (NMFS, 2000). Populations likely decreased due to a low intrinsic rate of natural increase, the long interval to time of reproduction, and human impacts, most notably overfishing, incidental take in nets (due in part to its body size and unusual morphology), and habitat loss (development of shoreline and nearshore habitats).

Humpback and Sperm Whales

These species are found offshore of the project area in deepwater beyond the third reef line. Sperm whales may be found year round near the project area, while humpbacks are found seasonally during their migration to and from breeding grounds in the Caribbean.

Protective Measures Taken in the Project Area as Part of the Proposed Action

Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. While efforts to reduce impacts to habitats were fruitful, it was determined that if rock removal was needed, options not involving blasting were possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds. This constant pounding would serve to disrupt animal behavior in the area. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that blasting is actually the least environmentally damaging method for removing the rock from within the project. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects are reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve sperm and humpback whale, sea turtles and smalltooth sawfish. Foremost among the measures are protective actions to ensure that sea turtles and smalltooth sawfish are not killed and whales are not harassed due to blasting activities, if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures, which, although developed for marine mammals, will also be utilized to protect such species as sea turtles and smalltooth sawfish.

<u>*Blasting*</u>

To achieve the deepening of the Lake Worth Iinlet pretreatment of the rock areas may be required. Blasting is anticipated to be required for some or all of the deepening and extension of the channel, where standard construction methods are unsuccessful. Current geotechnical investigations have shown the majority of rock to be inside the harbor in the turning basin, not in the entrance channel. The work may be completed in the following manner:

1. Contour dredging with either bucket, hydraulic or excavator dredges to remove material that can be dredged conventionally and determine what areas require blasting.

2. Pre-treating (blasting) the remaining above grade rock, drilling and blasting the "Site Specific" areas where rock could not be conventionally removed by the dredges.

3. Excavating with bucket, hydraulic or excavator dredges to remove the pre-treated rock areas to grade.

All drilling and blasting will be conducted in strict accordance with local, state and federal safety procedures. Marine Wildlife Protection, Protection of Existing Structures, and Blasting Programs coordinated with federal and state agencies.

Based upon industry standards and USACE, Safety & Health Regulations, the blasting program may consist of the following:

The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock. The blasting would consist of up to 3 blasts per day, preparing for removal of approximately 1500 cubic yards per blast.

The following safety conditions are standard in conducting underwater blasting:

- Drill patterns are restricted to a minimum of 8 ft separation from a loaded hole.
- Hours of blasting are restricted from 2 hours after sunrise to 1 hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the "work effort" of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

Because of the potential duration of the blasting and the project area as habitat for listed and threatened species, a number of issues will need to be addressed. One of the key issues is the extent of a safety radius for the protection of marine wildlife. This is the distance from the blast site which any protected species must be in order to commence blasting operations. Ideally the safety radius is large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed

There are a number of methods that can be used to calculate a safety radius. Little published data exists for actual measurements of sub aqueous blasts confined to a rock layer and their impacts to marine mammals or turtles. There is some information on the impacts to fish from similar blasts. Both literature searches and actual observations from similar blasting events will be used as a guide in establishing a safety radius that affords the best protection from lethal harm to marine wildlife. The following will be considered in establishing the radius for blasting inshore of the outer reef:

The U.S. Navy Dive Manual and the FFWCC Endangered Species Watch Manual the safety formula for an uncontrolled blast suspended in the water column, which is as follows:

R = 260 (cube root w)
R = Safety radius
W = Weight of explosives

This formula is a conservative for the blasting being done within Port Everglades, as the blast will be confined within the rock and not suspended in the water column. This formula and plan are consistent with the plans for Miami Harbor Phase II and Miami Harbor GRR that the Corps consulted with NMFS on (I/SER/2002/00178 – September 23, 2002 and F/SER/2002/01094 – February 23, 2003, respectively). In both cases, NMFS found concurred with the Corps' determination that the proposed confined blasting at Miami Harbor "may affect, but is not likely to adversely affect sea turtles”. The Lake Worth Inlet blasting plan will be designed to be consistent with the Miami Harbor projects.

If blasting is required outside the turning basin and into the entrance channel, the Corps proposes to use aerial and passive acoustic surveys to determine if there are sperm or humpback whales within a 1-nautical mile (nm) radius of the project area. In the Biological Opinion for the shock trial of the USS Winston Churchill (DDG-81) (NMFS, 2000b), NMFS required the Navy to establish a zone of 3 nm for acoustic monitoring and 2 nm for aerial monitoring for three 10,000 lb open water unconfined explosions. Blasting for the channel extension will utilize confined blasts drilled into the substrate, and as a result the Corps believes that any acoustic or pressure effects to the project area will be substantially less than those evaluated by NMFS in setting the safety zones for the Churchill tests.

Conservation Measures
It is crucial to balance the demands of the blasting operations with the overall safety of the species. A radius that is excessively large will result in significant delays that prolong the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. Because of these factors, the goal is to establish the smallest radius possible without compromising animal safety and provide adequate observer coverage for whatever radius is agreed upon.

Aerial reconnaissance, where feasible and possible, is critical to support the safety radius selected in addition to boat-based and land support reconnaissance. Additionally, an observer will be placed on the drill barge for the best view of the actual blast zone and to be in direct contact with the blaster in charge.

Prior to implementing a blasting program a Test Blast Program will be completed. The purpose of the Test Blast Program is to demonstrate and/or confirm the following:

- Drill Boat Capabilities and Production Rates
- Ideal Drill Pattern for Typical Boreholes
- Acceptable Rock Breakage for Excavation
- Tolerable Vibration Level Emitted
- Directional Vibration
- Calibration of the Environment

The Test Blast Program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. Each Test Blast is designed to establish limits of vibration and airblast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the Test Blast Program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for Blasting Plan. During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds Per Delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak Vector Sum
- Air Blast, Overpressure

<u>Effects of the Action on Protected Species.</u>
As previously stated, the Corps believes that the loggerhead turtle, green turtle, smalltooth sawfish and Johnson's seagrass have the potential to be effected by the proposed dredging project. The project may have the following adverse impacts on listed/protected species are:

- direct effect of blasting in the turning basin.
- direct effect of dredging activities
- indirect effects

Direct Effects

Blasting

Sea turtles
Specific information regarding the likely direct impact of explosives on sea turtles is not available. Studies regarding the impacts of relatively minuscule explosives on humans noted that minor injuries such as small bruises or perforations of the intestinal tract occasionally occur well beyond ranges in which human lung damage could occur (Christian and Gaspin, 1974). Christian and Gaspin (1974) note that these minor injuries could become serious if left unattended. Sea turtles with untreated internal injuries would have increased vulnerability to predators and disease. In the Environmental Impact Statement prepared by the Navy to consider the effects of explosives used in shipshock tests, nervous system damage was cited as a possible impact to sea turtles caused by blasting. Damage of the nervous system could kill sea turtles through disorientation and subsequent drowning. The Navy=s review of previous studies suggested that rigid masses such as bone (or carapace and plastron) could protect tissues beneath them; however, there are no observations available to determine whether the turtles= shells would indeed afford such protection.

Studies conducted by Klima *et al*., (1988) evaluated blasts of only approximately 42 lbs on sea turtles (4 ridleys, 4 loggerheads) placed in surface cages at varying distances from the explosion. Christian and Gaspin=s (1974) estimates of safety zones for swimmers found that, beyond a cavitation area, waves reflected off a surface have reduced pressure pulses; therefore, an animal at shallow depths would be exposed to a reduced impulse. This finding, which considered only very small explosive weights, implies that the turtles in the Klima *et al*. (1988) study would be under reduced effects of the shock wave. Despite this possible lowered level of impact, 5 of 8 turtles were rendered unconscious at distances of 229 to 915 m from the detonation site. Unconscious sea turtles that are not detected, removed and rehabilitated likely have low survival rates.

Blasting will affect nearby finfish and invertebrates and cause short-term changes to the physical characteristics of the benthos. Fish and invertebrates killed or injured by the blasting may provide a short-term enhancement of foraging opportunities for green and loggerhead sea turtles. Through new recruitment and local migrations, finfish and benthic invertebrates are expected eventually to repopulate the affected area. Any modifications of the local area=s environment, as far as sea turtle habitat, are not expected to be significant in the long term.

Smalltooth Sawfish

Blasting rock underwater produces a pressure wave in water that can produce fish mortality. Different types of fish have different mortality thresholds. This depends on whether the fish dwell near the surface, on the bottom, or in between.

The magnitude of the pressure wave generated in greatly affected by the stemming of the blastholes, distance between holes, and the delay time of the holes.

Normally, mortality occurs in the range of 150-psi overpressure for fish. In practice this is a 75-foot to 100-foot radius around the blasting area.

Dredging

Sea Turtles

The effects of hopper dredging on sea turtles on the Atlantic coast were analyzed by NMFS in the 1997 biological opinion entitled “The continued hopper dredging of channels and borrow areas in the southeastern United States”. If it is determined that a hopper dredge will be used, the Terms and Conditions of this opinion will be applied to the project. If a cutterhead or clamshell dredge is used, based on a finding in the November 25, 1991 biological opinion between NMFS and the Corps that states:

> “Pipeline dredges are relatively stationary and only influence small areas at any given time. For a turtle to be taken with a pipeline dredge, it would have to approach the cutterhead and be caught in the suction. This type of behavior would appear unlikely, but may be possible. Presently, NMFS has determined that pipeline dredges are unlikely to adversely affect sea turtles”.

Based on this determination, the Corps finds that use of a cutterhead dredge may effect, but is not likely to adversely affect sea turtles. If a clamshell dredge is used, there is no suction to capture a sea turtle and the turtle would have to be caught between the two halved of the clamshell. While this is not impossible, it is improbable. The Corps has also determined that use of a clamshell dredge may effect, but is not likely to adversely affect sea turtles.

Smalltooth sawfish
The smalltooth sawfish may be affected by dredging nearshore areas in channels that are currently suitable habitats (areas of sand and/or mud bottoms less than 30 feet in depth) and by blasting if there is an animal present in the blast zone at time of detonations, a stunned or damaged animal may be captured by the clamshell dredge if it could not move out of the way.

Johnson's Seagrass
Dredging will result in the removal of approximately 4 acres of seagrass beds where *H. johnsonii* is the sole constituent or associate of other seagrass species in the areas surrounding the turning basin. This impact will include the direct removal of *H. johnsonii*. Changes in bottom depth through deepening and widening efforts within the Port is expected to make resulting habitats unsuitable for re-colonization of *H. johnsonii*.

Indirect Effects

Sea Turtles
Since beaches of Palm Beach County provide important nesting areas for three sea turtle species, the project area comprises important resources for turtles. Removal of sections of hardbottom and seagrass habitats will eliminate potential foraging habitat for juvenile sea turtles. The reduction in such habitat may slightly decrease the carrying capacity of the region for turtles. Also, since these habitats are also utilized as refugia for hatchling turtles, an increase in predation may be anticipated. Finally, dredge activities and associated disturbances (noise, lights, etc.) may interrupt the movement of turtles swimming toward or away from nesting beaches. In fact, the highest potential impact to sea turtles may be the use of explosives to remove areas of rock within the turning basin or entrance channel. It is extremely likely that both the pressure and noise associated with blasting will physically damage sensory mechanisms and other physiological functions of individual sea turtles.

Johnson's seagrass
Areas of Johnson's seagrass adjacent to construction activities may be temporarily affected by increased turbidity and lower water clarity during construction.

Effect Determination
The Corps has determined that the proposed expansion of Lake Worth Inlet may adversely affect Johnson's seagrass within the action area and requests initiation of formal consultation with NMFS. The proposed project may affect, but not likely to adversely affect; the green turtle, loggerhead turtle, Kemp's ridley turtle, Hawksbill turtle, leatherback turtle, humpback whale, sperm whale, and smalltooth sawfish.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
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December 12, 2012

Alan M. Dodd, Colonel
District Commander
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Service CPA Activity Code: 41420-2008-FA-0252
Date Received: June 26, 2012
Formal Consultation Initiation Date: October 1, 2012
Project: Lake Worth Inlet Deepening and Widening
County: Palm Beach

Dear Colonel Dodd:

This document transmits the U.S. Fish and Wildlife Service's (Service) decision regarding the application of the proposed Lake Worth Inlet deepening and widening, Palm Beach County, Florida to the August 22, 2011, Statewide Programmatic Biological Opinion (SPBO) concerning sand placement activities along the coast of Florida for the U.S. Army Corps of Engineers (Corps) (Service Log No. 41910-2011-F-0170; Service, 2011). The Corps determined on September 28, 2012, the proposed project "may affect" the threatened loggerhead sea turtle (*Caretta caretta*), endangered leatherback sea turtle (*Dermochelys coriacea*), endangered green sea turtle (*Chelonia mydas*), endangered hawksbill sea turtle (*Eretmochelys imbricata*), and endangered Kemp's ridley sea turtle (*Lepidochelys kempii*), and "may affect, but is not likely to adversely affect" the endangered West Indian manatee (*Trichechus manatus*). The Service concurs with these determinations. This document is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq*.). Your June 26, 2012, request for formal consultation was received on June 26, 2012.

PROJECT DESCRIPTION

The Corps proposes to widen and deepen Lake Worth Inlet navigation channel and turning basin, Palm Beach County, Florida (Figure 1). The depth of the entrance channel will be increased from 37 to 47 feet and the turning basin from 33 to 43 feet. In addition, widening is necessary in certain areas for safe navigation of larger vessels. The entrance channel requires a flare to the south as prevailing currents cause navigation hazards. The proposed flare will start at the south jetty and extend approximately 2,500 feet to the southeast (Figure 2). Within the entrance channel, the northern channel wall will be widened by 60 feet from the north jetty to the beginning of the turn to the southeast. At the turn, the northern side of the channel will be widened 150 feet to ensure a 400-foot channel width throughout. The area at the southern edge of the turning basin will be widened 150 feet to the south.

Using traditional dredging methods (*e.g.,* backhoe, clamshell, cutterhead, hydraulic) and possibly confined underwater blasting as a bedrock pre-treatment technique, approximately 1.4 million cubic yards (cy) of material will be removed from the navigation channel and turning basin. Using a dredge with pump-out capability, beach compatible dredge material (estimated at 250,000 cy) will be pumped from the dredge onto the shoreline between the Florida Department of Environmental Protection (DEP) reference monuments R-76 to R-79 (Figure 3) through a temporary pipeline positioned over the south jetty. Bulldozers will move and grade the material to produce the authorized beach design. Beach compatible material will not be placed within the above outlined fill template during peak sea turtle nesting season (May 1 – October 31). Non-beach compatible sand will be placed in an authorized nearshore placement site south of the inlet. Other rock and coarse material may be placed in a previously dredged depression within Lake Worth as part of compensatory mitigation for seagrass impacts. Other dredged rock and material not suitable for mitigation may be transported to the Ocean Dredged Materials Disposal Site or placed in a permitted, upland disposal site on Peanut Island. All non-beach compatible material can be placed in its respective location throughout the year. Vegetated upland habitat will be protected to the maximum extent possible to minimize disturbance; therefore, impacts associated with the beach access corridors and staging areas are not anticipated. If impacts are incurred, all impacted areas and vegetation will be restored to preconstruction condition and elevation.

The frequency of the proposed inlet expansion and sand placement project will not exceed more than one event; however, the project may be completed over a period of 2 to 3 years due to funding restrictions. The intent of the proposed project to expand Lake Worth Inlet is to maintain a safe environment for commercial vessels.

The action area is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action. The Service identifies the action area to include the entrance channel, turning basin, Peanut Island, Palm Beach Harbor Ocean Dredged Materials Disposal Site, pipeline corridors, staging areas, and approximately 3,450 feet of Palm Beach County shoreline between DEP monuments R-76 and R-79. The project is located along the Atlantic Ocean, Lake Worth Inlet, Palm Beach County, Florida at latitude 26.7724 and longitude -80.0322.

The Service has determined the proposed project is appropriate to apply to the SPBO. The minimization measures, Reasonable and Prudent Measures, and Terms and Conditions in the SPBO are applicable to the proposed project and must be followed for nesting sea turtles. The Corps has agreed to follow and implement the minimization measures, Reasonable and Prudent Measures, and the Terms and Conditions that apply to the proposed project.

In addition, the Standard Manatee Conditions for In-Water Work (Florida Fish and Wildlife Conservation Commission [FWC] 2011) and the minimization measures outlined in the SPBO shall be implemented to avoid potential impacts on manatees. Also, in order to further minimize impacts to manatees, the following precautionary measures will be implemented.

1. Confined blasting activities will only take place during daylight hours and will not take place between November 15 and March 31 of any year.
2. The use of a clamshell dredge will be prohibited at night year round.
3. Only backhoe/excavator dredging activities will be permitted to take place 24 hours per day, except between November 15 and March 31, during which time these dredging activities will only be permitted during daylight hours.
4. Hydraulic dredging (cutter suction, hopper) activities will be permitted to take place 24 hours per day throughout the year.
5. All other protective measures outlined in the Corps' Biological Assessment dated June 2012 concerning standard manatee conditions, confined blasting methods, monitoring, and minimization measures will be executed.

To reduce potential impacts on piping plovers, the commitments outlined in the SPBO shall be implemented. In order to comply with the Migratory Bird Treaty Act (16 U.S.C. 701 et seq.) and potential for the proposed project to impact nesting shorebirds, the Corps shall follow FWC standard guidelines to protect against impacts to nesting shorebirds during implementation of this project during the periods from February 15 to August 31. If any construction is performed from April 1 to August 31, the Corps' standard migratory bird protection policy will be implemented. In addition, surveys for shorebirds and other migratory bird species will be completed prior to construction activities. Surveys will begin on April 1 or 45 days prior to construction commencement, whichever is later, and will be conducted daily throughout the construction period.

The Service anticipates no more than 27.7 miles of highly eroded shoreline along the Florida coastline (no more than 8.8 miles within the Northern Gulf of Mexico Recovery Unit [NGMRU] and no more than 18.9 miles within the Peninsular Florida Recovery Unit [PFRU]) would receive sand per year during nonemergency years with a maximum of 102 miles of shoreline (38 miles within the NGMRU and 64 miles of shoreline within the PFRU) receiving sand during or following an emergency event (declared disaster or Congressional Order) as a result of the SPBO. The amount or extent of incidental take for nesting sea turtles will be considered exceeded if during the course of the proposed project, sand is placed on more shoreline per year than authorized in the SPBO as outlined above.

FISH AND WILDLIFE RESOURCES

This section is provided in accordance with the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*) to address other fish and wildlife resources in the project area.

Hardbottom reef habitat and seagrasses

Between June and October 2008, field surveys were conducted to document the seagrass, hardbottom, and coral reef communities within and adjacent to the proposed project area (PBS&J 2009). The objectives of the surveys were to:

1. Produce a detailed, seagrass species-specific, coral reef, and hardbottom habitat map capable of estimating impact acreage.
2. Quantify the distribution of Johnson's seagrass (*Halophila johnsonii*) within the expansion area.
3. Estimate the density of seagrass occurrence within the survey area.
4. Determine the distribution and abundance of *Acropora* spp. within the near offshore area.

During the seagrass component of the survey, a total of 452 quadrats were assessed for species-specific and total seagrass coverage. It is estimated that approximately 4.5 acres of seagrass will be impacted by the proposed project. The Corps is currently working with the Palm Beach County Environmental Resources Management division to evaluate potential mitigation sites. In addition, the Corps is presently developing a mitigation plan which will be reviewed and ultimately authorized by the DEP and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries).

Hardbottom habitat does not occur immediately north of Lake Worth Inlet (Applied Technology and Management Inc., 1995); however, surveys south of the Inlet, between DEP monuments R-76 and R-83 indicated that hardbottom communities are much more prevalent south of DEP monument R-79. Hardbottom habitat significantly declines between DEP monuments R-76 and R-79. The only hardbottom habitat observed within this area was directly associated with the south jetty, a small section (27 square feet) of uncolonized exposed rock north of DEP monument R-77, a small area of exposed rock in the intertidal region 350 feet north of DEP monument R-78, and a lone outcropping of rock located midway between DEP monuments R-78 and R-79 (Applied Technology and Management Inc., 1995). Based on surveys conducted in 2008, total hardbottom areal coverage, excluding vertical surfaces, was estimated to be 14.98 acres (PBJ & J 2009). Recorded taxa included Hydrozoa, Zoanthidea, Porifera, macroalgae, turf algae, coralline algae,a small percentage of scleractinian coral, echinoderms, crustaceans, ascidians, and sand/shell/detritus. In all cases, the predominant fauna was comprised of suspension and filter-feeding species. Mean live bottom coverage varied between 10.9 and 58.1 percent with qualitatively more biota recorded on the vertical surfaces relative to adjacent shelf habitats. In addition, based on surveys conducted at eight hardbottom sites, *Acropora* spp. was not found at any of the locations. The Corps anticipates that approximately 5 acres of hardbottom habitat will be impacted within the proposed project template.

Based on the proposed project design, approximately 4.5 and 5 acres of impacts are anticipated to seagrass and nearshore hardbottom habitat, respectively. Therefore, the Corps will consult with the NOAA Fisheries whom will assess potential impacts to hardbottom habitat and seagrasses within the dredge template, sand placement fill template, shoreline downdrift area, and both non-beach compatible dredge material disposal sites. In addition, the NOAA Fisheries will assess and consult with the Corps concerning potential impacts to foraging and swimming sea turtles, and all other marine species under their jurisdiction within the action area.

Please submit a report by July 31 of the following year of construction as described in the SPBO Term and Condition B19 following completion of the proposed work.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take outlined in the SPBO is exceeded. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.
2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion.
3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion.
4. A new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the effort to conserve fish and wildlife resources. Should you have additional questions or require clarification regarding this letter, please contact Jeff Howe at 772-469-4283.

Sincerely yours,

Craig Aubrey

for Larry Williams
Field Supervisor
South Florida Ecological Services Office

cc: electronic only
Corps, Jacksonville, Florida (Patrick Griffin)
DEP, Tallahassee, Florida (Lanie Edwards)
EPA, West Palm Beach, Florida (Ron Miedema)
FWC, Imperiled Species Management Section, Tallahassee, Florida (Robbin Trindell)
NOAA Fisheries, West Palm Beach, Florida (Jocelyn Karazsia)
NOAA Fisheries, Fort Lauderdale, Florida (Audra Livergood)
Service, Atlanta, Georgia (David Flemming)
Service, St. Petersburg, Florida (Anne Marie Lauritsen)
Service, Panama City, Florida (Patty Kelly)
USGS, Florida Integrated Science Center, Gainesville, Florida (Susan Walls)

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Applied Technology and Management Inc. 1995. Lake Worth Inlet Management Plan, Phase III Environmental Evaluations prepared for the Town of Palm Beach.

Florida Fish and Wildlife Conservation Commission (FWC). 2011. Standard Manatee Conditions for In-Water Work 2011. Tallahassee, Florida [Internet]. [cited October 1, 2012]. Available from: http://myfwc.com/media/415448/Manatee_StdCondIn_waterWork.pdf

PBS & J. 2009. Palm Beach Harbor Navigation: Feasibility Study Environmental Resources Report, Palm Beach County, Florida.

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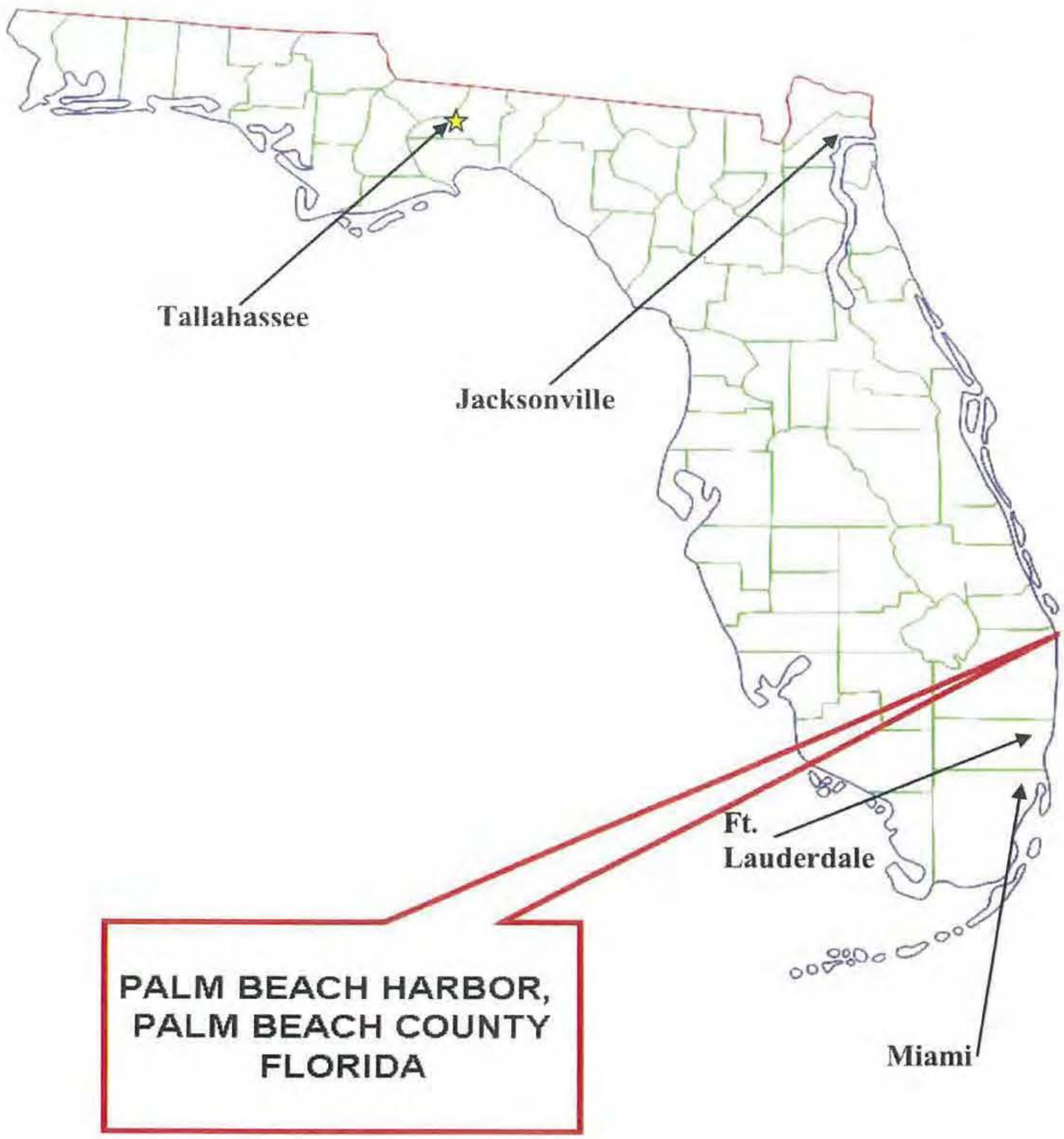

Figure 1. Location of the proposed inlet expansion project, Lake Worth Inlet, Palm Beach County, Florida.

Figure 2. Location of the entrance channel and turning basin, Lake Worth Inlet, Palm Beach County, Florida. Proposed expansion is illustrated in yellow.

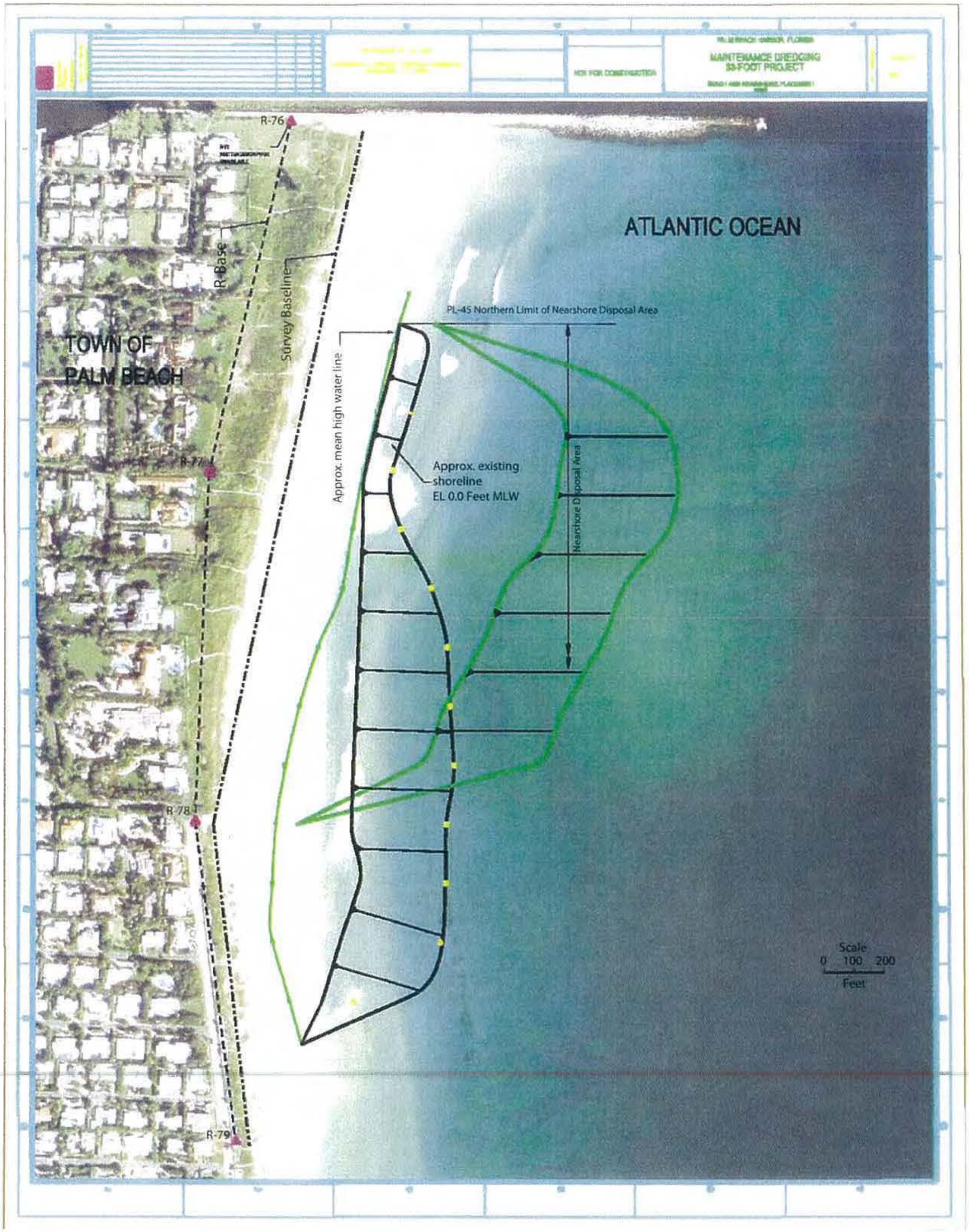

Figure 3. Location of the fill template south of Lake Worth Inlet, Palm Beach County, Florida.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31:KBD
SER-2012-2743

NOV 07 2013

Mr. Eric Summa
Chief, Environmental Branch
Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Ref.: Lake Worth Inlet Widening and Deepening Project, Riviera Beach, Palm Beach County, Florida

Dear Mr. Summa:

Enclosed is the National Marine Fisheries Service's (NMFS's) biological opinion (opinion) to the U.S. Army Corps of Engineers (USACE) on the proposed Lake Worth Inlet Widening and Deepening Project in Palm Beach County, Florida. The following opinion analyzes the project effects on green sea turtles (*Chelonia mydas*), loggerhead sea turtles (*Caretta caretta*), and Johnson's seagrass (*Halophila johnsonii*) in accordance with Section 7 of the Endangered Species Act (ESA) of 1973.

This opinion is based on information provided in your July 6, 2012, letter, information from the Biological Assessment and Draft Integrated Feasibility Report and Environmental Impact Statement for the Lake Worth Inlet Widening and Deepening, the Environmental Assessment for the Palm Beach Harbor Operations and Maintenance, the January 2009 Final Report on the Palm Beach Harbor Navigation Feasibility Study (Environmental Resources Report), and information from previous NMFS consultations conducted on the use of hopper dredging methods. It is our opinion that the action, as proposed, is likely to adversely affect green sea turtles, loggerhead sea turtles, and Johnson's seagrass, but is not likely to jeopardize their continued existence.

We look forward to further cooperation with you on other projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Kay Davy, consultation biologist, by e-mail at Kay.Davy@noaa.gov or (727) 415-9271.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure: Biological Opinion

File: 1514-22.F.4

Endangered Species Act - Section 7 Consultation
Biological Opinion

Agency:	United States Army Corps of Engineers, Jacksonville District (USACE)
Activity:	Lake Worth Inlet Widening and Deepening Project
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida (NMFS Consultation Number SER-2012-2743)
Approved By:	Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	Nov 7, 2013

ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
°C	Degrees Celsius
CFR	Code of Federal Regulations
cm	Centimeter
CPUE	Catch per Unit Effort
DPS	Distinct Population Segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	Degrees Fahrenheit
ft	Feet
FWC	Florida Fish and Wildlife Conservation Commission
GRBO	Gulf (of Mexico) Regional Biological Opinion
ITS	Incidental Take Statement
kg	Kilogram
km	Kilometer
m	Meter
mt	Metric Ton
mm	Millimeter
mg/L	Milligrams per Liter
NAST	National Assessment Synthesis Team
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRC	National Research Council
NWA DPS	Northwest Atlantic Distinct Population Segment
O&M	Operation and Maintenance
PIT	Passive Integrated Transponder
RBO	Regional Biological Opinion
RPMs	Reasonable and Prudent Measures -
SARBO	South Atlantic Regional Biological Opinion
SEFSC	Southeast Fisheries Science Center
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SPGP	State Programmatic General Permit
STSSN	Sea Turtle Stranding and Salvage Network
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USN	U.S. Navy

Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further conserve the species. In the case of Johnson's seagrass, since take of listed marine plants is not prohibited and thus not included in an incidental take statement, the opinion will not include RPMs but instead limit itself to conservation recommendations.

This document represents NMFS's opinion based on our review of impacts associated with the proposed action to widen and deepen Lake Worth Inlet in Palm Beach County, Florida. This opinion analyzes the project's effects on Johnson's seagrass, sea turtles, whales, and smalltooth sawfish in accordance with Section 7 of the ESA, and is based on project information provided by the United States Army Corps of Engineers (USACE), including the draft Integrated Feasibility Report and Environmental Impact Statement (EIS), the Environmental Assessment (EA) for Operation and Maintenance (O&M), and other sources of information including the published literature cited herein.

Several marine mammals protected under the Marine Mammal Protection Act (MMPA) occur in the area of the proposed project, including bottlenose dolphin (*Tursiops truncatus*), spinner dolphin (*Stenella longirostris*), and long-finned pilot whales (*Globicephala melas*). If these or other non-ESA listed marine mammals may be adversely affected by the proposed action, a take authorization under the MMPA may be necessary. Please contact NMFS' Protected Resources headquarters office at (301) 713-2332 for more information

1 CONSULTATION HISTORY

July 6, 2012: NMFS receives a request for ESA consultation from the USACE requesting initiation of formal consultation for the Lake Worth Inlet Widening and Deepening. The USACE determines that the project may adversely affect Johnson's seagrass within the action area. The USACE also determines the project may affect, but would not likely adversely affect green, loggerhead, Kemp's ridley, hawksbill, and leatherback sea turtles, humpback whales, sperm whales, and smalltooth sawfish.

November 1, 2012: NMFS provides a request for additional information for clarification on the nearshore dredged material disposal site since the information provided to the Florida Department of Environmental Protection for review was apparently different.

December 13, 2012: USACE responds that there are additional disposal sites associated with the Palm Beach Harbor O&M National Environmental Policy Act (NEPA) document that will be forthcoming.

March 5, 2013: NMFS, not having received the requested information, again requests additional information and surveys that address potential environmental impacts related to the proposed nearshore placement of dredged materials.

May 13, 2013: NMFS Habitat Conservation Division informs NMFS Protected Resources Division that the draft EIS for this project became available for review on April 19, 2013.

June 5, 2013: USACE responds that they do not have any additional surveys to provide and that there will likely not be much beach quality sand from this project, and therefore it will be put in the existing nearshore template for the Operation and Maintenance (O&M) project. They also state that they do not expect there to be an issue with impacts down drift as they regularly put material there from the O&M project.

June 5, 2013: NMFS requests a copy of the EA prepared for the O&M project.

June 5, 2013: USACE provides NMFS a copy of the O&M EA.

June 5, 2013: NMFS initiates formal consultation.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The proposed action includes deepening the Lake Worth Inlet navigation channel from 35 feet to 41 feet and widening it from 400 feet to between 440 to 460 feet with a flared approach on the south side of the entrance channel, deepening the main turning basin from 33 feet to 39 feet, and extending the southern boundary of the turning basin an additional 150 feet. A detailed description of the proposed project and all of the alternatives considered is included in the draft EIS prepared by the USACE. The Port of Palm Beach is the project sponsor.

An estimated 1.97 million cubic yards of material will be dredged for project construction. Approximately 4.5 acres of seagrass habitat and 4.9 acres of low-relief hardbottom will be impacted by the proposed project. Sand, soft rock, and rock fragments will be removed using either bucket or excavator dredges. Hard rock will be removed by confined blasting or by using large cutterhead dredging equipment to pre-treat the rock prior to removal by conventional dredging methods (i.e., bucket or excavator dredge). Beach-quality material will be placed in the nearshore disposal site. As part of the construction, other rock/coarse materials will be beneficially used by placing them in a previously dredged depression within Lake Worth to create seagrass habitat as compensatory mitigation for seagrass impacts. Unsuitable material will be taken to the Palm Beach Harbor Ocean Dredged Material Disposal Site (ODMDS).

Blasting

In the area where blasting could occur or any area where blasting is required to obtain channel design depth, the following protected species (marine mammals and sea turtles) measures shall be employed, before, during, and after each blast. This blasting proposal must include information concerning a watch program and details of the blasting events. The three zones associated with ensuring the safety of protected species (Danger, Safety, and Watch) cannot be calculated until the weight of the explosive charges for all delays are known, as the zones are calculated using the largest of the delay charges. These zones will be calculated by the contractor and this information will be included in their blasting plan denoted on monitoring reports and provided to Protected Species Observers (PSOs) before each blast for incorporation in the watch plan for each planned detonation. The following equations will be used to calculate the impact zones for confined, stemmed charges (Hempen et al. 2007, Jordan et al. 2007):

Danger Zone Radius (ft) = 260 $\sqrt[3]{\text{lb/delay}}$
The distance from a detonation within which both injury and mortality may occur.

Safety Zone Radius (ft) = 520 $\sqrt[3]{\text{lb/delay}}$
The distance from a detonation within which injury, temporary threshold shift (TTS or temporary hearing loss), and behavioral reactions may occur.

Watch Zone Radius (ft) = three times the distance of the danger zone. A precautionary area to ensure that animals entering or traveling close to the Safety Zone are spotted and appropriate actions (i.e., a delay in blasting activities) can be implemented before the animal is at risk.

The blasting program may consist of the following safety conditions that are based on industry standards in conducting confined underwater blasting, as well as USACE Safety and Health Regulations:

- The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock.
- Drill patterns are restricted to a minimum of an eight-foot separation from a loaded hole.
- Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.

- The blast design will consider matching the energy in the "work effort" of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.
- Delay timing to ensure at least eight milliseconds between delays to break larger blast weights into smaller blasts, increasing blast efficiency while reducing pressure released into the water column.

The watch program will abide by the following procedures:

- The watch program will begin at least one hour prior to the scheduled start of blasting to identify the possible presence of protected species and will continue until at least one-half hour after detonations are complete.
- The watch program shall consist of a minimum of six PSOs.
- Observers will be equipped with two-way radios, polarized sunglasses, binoculars, a red flag for backup visual communication, and a sighting log with a map to record sightings.
- All blasting events will be weather dependent; climatic conditions must be suitable for optimal viewing conditions, determined by the observers.
- The watch program shall include a continuous aerial survey to be conducted by aircraft, as approved by the Federal Aviation Administration.
- The event shall be halted if an animal(s) is spotted within the Safety Zone.
- An "all-clear" signal must be obtained from the aerial observer before detonation can occur.
- The blasting event shall be halted immediately upon request of any of the PSOs.
- If animals are sighted, the blast event shall not take place until the animal(s) moves out of the area under its own volition. Animals shall not be herded away or harassed into leaving. Specifically, the animals must not be intentionally approached by project watercraft. If the animal(s) is not sighted a second time, the event may resume 30 minutes after the last sighting.
- The observers and contractors shall evaluate any problems encountered during blasting events and logistical solutions shall be presented to the Contracting Officer. Corrections to the watch, if problems are encountered, shall be made prior to the next blasting event. If any one of the aforementioned conditions is not met prior to or during the blasting, the watch observers shall have the authority to terminate the blasting event, until resolution can be reached with Contracting Officer. The Contracting Officer will contact NMFS.
- If an injured or dead marine mammal or marine reptile is sighted after the blast event, the watch observers shall contact the USACE and the USACE will contact the resource agencies at the following phone numbers:

    i. NMFS Southeast Regional Office (SERO)- Protected Resource Division (PRD): (727)-570-5312 (sea turtles and sawfish)
    ii. NMFS - Emergency Stranding Hotline – 1-(877)-433-8299

- The observers shall maintain contact with the injured or dead mammal or sea turtle until authorities arrive. Blasting shall be postponed until consultations are completed and determinations can be made of the cause of injury or mortality. If blasting injuries are documented, all demolition activities shall cease. The USACE will then submit a revised plan to NMFS for review.

- Within 30 days after completion of all blasting events, the primary observer shall submit a report to the USACE, who will provide it to NMFS providing a description of the event, number, and location of animals seen and what actions were taken when animals were seen. Any problems associated with the event and suggestions for improvements shall also be documented in the report. A watch plan will be formulated based on the required monitoring radii and optimal observation locations. The watch plan consist of at least five observers including at least one aerial observer, two boat-based observers, and two observers stationed on the drill barge. Per the USACE, the optional sixth observer will be placed in the most optimal observation location (boat, barge, or aircraft) on a day-by-day basis depending on the location of the blast and the placement of dredging equipment. This process will ensure complete coverage of the three zones as well as any critical areas. The watch will begin at least one hour prior to each blast and continue for one-half hour after each blast (Jordan et al. 2007).

Test Blast Program

Prior to implementing a construction blasting program a test blast program would be completed. The test blast program would have all the same protection measures in place for protected species monitoring and protection as blasting for construction purposes. The purpose of the test blast program is to demonstrate and/or confirm the following:

- drill boat capabilities and production rates,
- ideal drill pattern for typical boreholes,
- acceptable rock breakage for excavation,
- tolerable vibration level emitted,
- directional vibration,
- calibration for the environment (water temp, salinity, etc.), and
- determination of safety zone radii and associated parameters, discussed above.

The test blast program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. The test blast program will take place in the project area and will count toward the pre-treatment of material, since the blasts of the test blast program will be cracking rock. Each test blast is designed to establish limits of vibration and air blast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the test blast program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for the construction blasting plan. During testing, the following data will be used to develop a regression analysis:

- distance,
- pounds per delay,
- peak particle velocities (PPV),

- frequencies of PPV,
- peak vector sum, and
- air blast overpressure.

If blasting is required in the entrance channel, the USACE proposes to use aerial and passive acoustic surveys to determine if there are humpback or sperm whales within a one nautical mile radius of the project area and delay blasting operations if necessary.

Dredging

The USACE has stated that if it is determined that a hopper dredge will be used, the terms and conditions of the South Atlantic Regional Biological Opinion (SARBO)[1] and the hopper dredging protocol (Appendix A) will be applied to the project. The terms and conditions in NMFS's September 25, 1997, SARBO on USACE-authorized hopper dredging along the South Atlantic Coast of the United States incorporates by reference the terms and conditions of NMFS' previous 1995 South Atlantic hopper dredging biological opinion to the USACE's South Atlantic Division, to reduce the potential for take. If a cutterhead or clamshell dredge is used, the USACE will apply the findings in the November 25, 1991, biological opinion between NMFS and the USACE that states: "Pipeline dredges are relatively stationary and only influence small areas at any given time. For a turtle to be taken with a pipeline dredge, it would have to approach the cutterhead and be caught in the suction. This type of behavior would appear unlikely, but may be possible. Presently, NMFS has determined that pipeline dredges are unlikely to adversely affect sea turtles." To date, NMFS has no new information that would change the basis of that conclusion.

Post-Dredging Operations

The USACE has stated that since dredging equipment does not typically result in a perfectly smooth and even channel bottom, a drag bar, chain, or other item may be dragged along the channel bottom to smooth down high spots and fill in low spots. According to the USACE, this bed-leveling finishing technique also reduces the need for additional dredging to remove any high spots that may have been missed by the dredging equipment. NMFS has previously stated in hopper dredging biological opinions that it may be more cost-effective to use a drag bar or other non-suction-type leveling device (and possibly less hazardous to sea turtles) than to conduct additional hopper dredging.

The widening and deepening of the federal channel will decrease the frequency of maintenance dredging that is currently being conducted in order to maintain the channel depths for the deeper draft vessels that are presently utilizing the port. According to information in the Palm Beach Harbor O&M EA (page 20), the proposed maintenance dredging will be conducted in accordance with the ESA, and specifically in compliance with the SARBO; the current version of the SARBO covers the effects of maintenance dredging of navigation channels but not new construction, including widening and deepening beyond originally authorized channel dimensions.

[1] Endangered Species Act Section 7 consultation on the continued hopper dredging of channels and borrow areas in the southeastern United States. Biological Opinion. September 25, 1997.

Mitigation

Mitigation compensation, between 8.25 to 11.25 acres for seagrass impacts and 4.9 to 9.8 acres for hardbottom impacts, will be performed. The final acreage amount will be determined during and following the public review of the EIS. To achieve mitigation success for seagrasses, the following steps will be implemented:

1. Fill unvegetated areas with dredged material to the base fill elevation or to the elevation below which seagrass communities no longer grow to restore topography for climax community seagrasses.

2. Utilize dredged material of a consistency that will allow for settling and achievement of stable slopes and for support of the maximum possible surface area of fine capping fill material.

3. Using finer capping fill material, create a stabilized surface treatment of approximately 11.25 acres (assumed acreage) to achieve an elevation and substrate composition suitable for recruitment of seagrasses.

4. Design the site to maximize facilitation of recruitment from adjacent seagrass beds but also incorporate strategic planting to achieve recovery if it does not occur naturally through recruitment within the desired timeframe.

For hardbottom mitigation, the following features will be used in selecting a good mitigation site:

1. Site already has some artificial hardbottom located within the boundaries, which would allow for quicker colonization of artificial hardbottom material, as well as allow for easier monitoring since it is adjacent to a county mitigation site that is currently monitored.

2. Site will have similar water depths to the depths of low-relief hardbottoms impacted by the proposed project (8-12 feet).

The material used in the mitigation construction will mimic the orientation of typical natural hardbottoms. The design will have a vertical relief of three to four feet, and will be placed in modules to provide the maximum structurally complexity. The footprint of the individual modules will be 20 feet wide by 40 feet long with space between modules consisting mainly of sand.

According to the draft EIS, the project is expected to take 1,000 days and if construction is initiated in 2015, it could be completed by 2018.

2.2 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for this project includes the waters and submerged lands within the project site and within a radius of where endangered species could be exposed to potentially harmful noise levels from dredging and/or blasting (Figure 1 and 2). The project is located within Lake Worth Inlet at latitude 26.7713°N, longitude 80.0428°W, North American Datum 1983 (NAD83), Riviera Beach, Palm Beach County, Florida (Figures 1 and 2) and includes the Palm Beach Harbor entrance channel, potential beach disposal areas, the Palm Beach Harbor ODMDS, and the routes of vessel travel to and from the disposal sites. Pursuant to ESA Section 3(5)(A)(i), all waters identified as existing (already constructed) federally authorized channels and harbors are excluded from the *Acropora* critical habitat designation. This project is located within Palm Beach Harbor, which is included in the list of excluded areas. No acroporid corals were found in the action area.

The harbor entrance is an artificial cut through the barrier beach and limestone formation connecting Lake Worth, a coastal lagoon, with the Atlantic Ocean. Lake Worth Inlet contains a federally-authorized channel and associated features that support a deepwater port. The existing channel sediments are predominately sand and shell. Limestone rock outcrops are found on either side of the channel at the interface between the inlet and the Intracoastal Waterway. Shoaling of the channel is a recurring problem. A sand transfer plant located on the north jetty takes sand and passes it under the inlet and to the beach located on the south side of the south jetty.

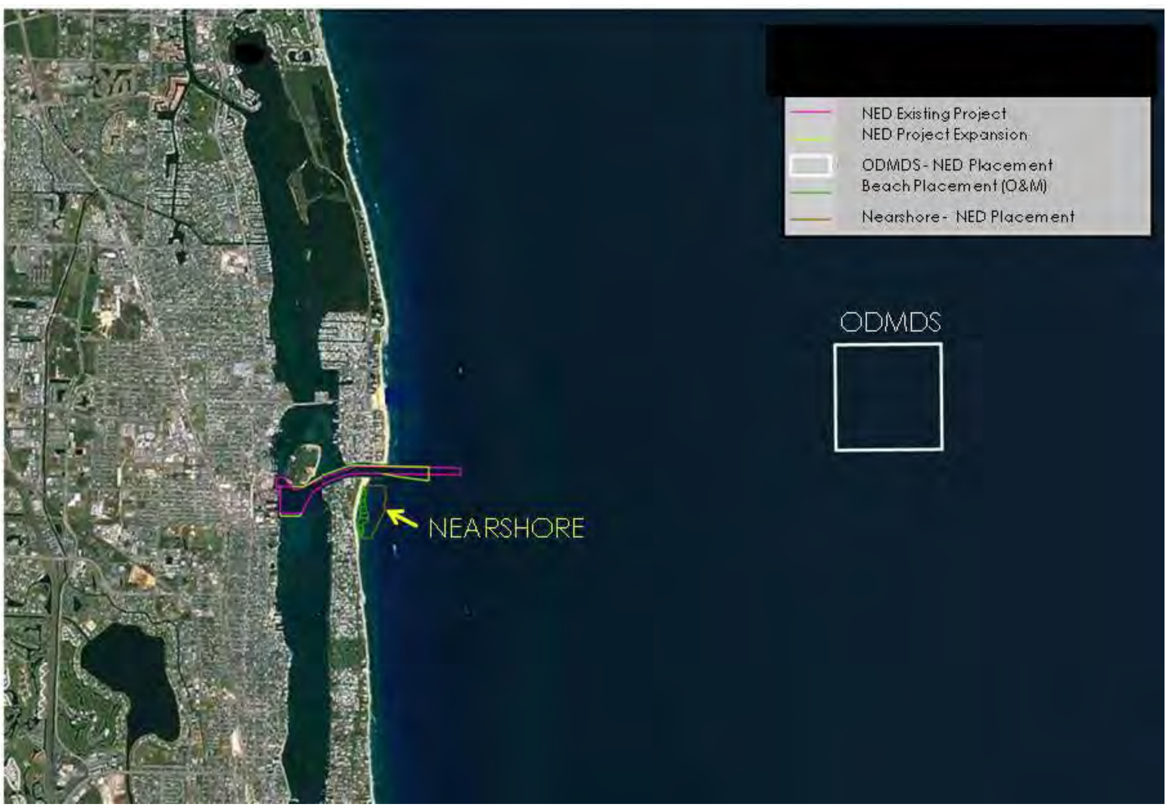

Figure 1. Project location

Figure 2. Existing project (black lines), proposed changes (white lines), and area of nearshore disposal template (yellow lines)

Seagrass, Hardbottom, and Coral Survey

The USACE contracted PBS&J to perform benthic surveys in the project area, which were conducted between June and October 2008. The USACE also performed quantitative seagrass surveys more recently in August 2011. According to PBS&J, seagrasses, hardbottom, and coral reefs were mapped and assessed within the different zones of the project (e.g., expansion Zones C,D, F, and G in Figure 3 were mapped for seagrasses and Zones A and B were mapped for coral reef habitat).

Figure 3. Location of survey zones.

In addition to quadrat sampling along transects, underwater videotaping of the substrate was also performed (Figure 4). PBS&J indicated the project site supports shoal grass (*Halodule wrightii*), Johnson's seagrass (*Halophila johnsonii*), and paddle grass (*Halophila decipiens*). Mean total seagrass coverage by patch varied from two percent to 100 percent cover with a survey-wide mean of 75.25 percent. Mean percent coverage of Johnson's seagrass ranged from 18.0 to 80.67 percent. The only species of hard corals found were found in Zones A and B: *Oculina diffusa, Stephanocoenia intersepta, Siderastrea siderea*, and *Siderastrea radians*. *Acropora* was not found at any of the survey locations. Hardbottom consists of boulders and rock outcrops. Live hardbottom varied between 10.9 percent (Zone C) and 58.1 percent (Zone B) with more biota observed on the vertical walls relative to adjacent shelf habitats. Hardbottom in Zone D consisted of intermittent rock outcroppings along the 20-ft contour of the channel slope. Zones F and G had occasional exposed rock outcroppings or large rock boulders on the southern slope of the turning basin. Small rock outcrops and rock rubble were found in the north central area of Zone G.

The hardbottom communities include areas of continuous hardbottom, sand with scattered hardbottom, and ledges formed at the cut edge of the channel. Continuous hardbottom areas possess thin veneers of sand. Scattered hardbottom habitat has sand pockets interspersed with hardbottom and some survey transects found a mix of seagrass and hardbottom. Vertical hardbottom habitat occurs along the walls of the entrance channel. Red boring sponge (*Cliona* sp.), red algae (*Meristiella echiocarpum*) and tube-building annelids were commonly encountered during the surveys.

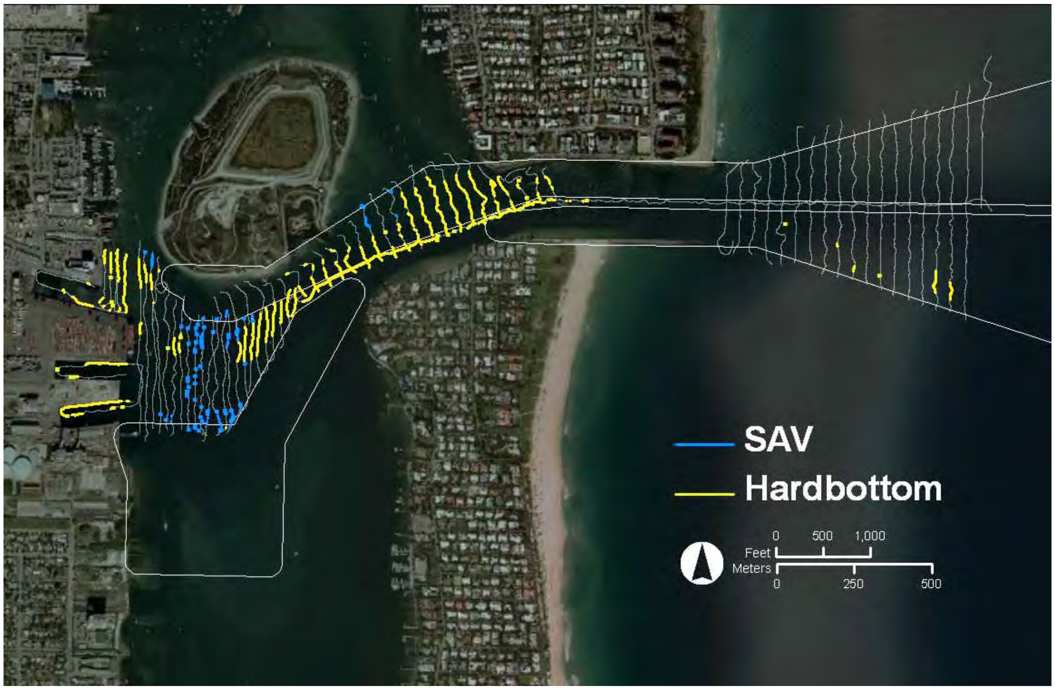

Figure 4. Location of hardbottom and SAV identified from towed video.

Zone C had the largest extent of Johnson's seagrass, with the western portion supporting a large monoculture of Johnson's. Johnson's seagrass densities tended to be greater in Zones C and D, with a mean value of 73.9 percent, than in Zones F and G with a mean value of 65.46 percent. However, a dense bed of Johnson's intermixed with shoal grass and paddle grass was documented in the southwest corner of Zone G.

Information from the August 2011 survey included in the EIS, reported seagrasses present in 14.6 acres in and near the action area, although coverage was low. Seagrass communities in shallow to mid-water depth (0-4 meters) were dominated by sparse cover of Johnson's in single-species and mixed beds, while paddle grass predominated in water depths greater than four meters. Shoal grass was also found in shallow water, primarily less than two meters deep. Frequency of occurrence, cover abundance scores, and density were relatively low for all seagrass beds documented.

3 STATUS OF LISTED SPECIES

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area:

Common Name	Scientific Name	Status
Sea Turtles		
Loggerhead sea turtle	*Caretta caretta*[2]	T
Hawksbill sea turtle	*Eretmochelys imbricata*	E

2 Northwest Atlantic Ocean distinct population segment (DPS).

Leatherback sea turtle	*Dermochelys coriacea*	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Green sea turtle	*Chelonia mydas*[3]	E/T
Fish		
Smalltooth sawfish	*Pristis pectinata*[4]	E
Marine Mammals		
Humpback whale	*Megaptera novaeangliae*	E
Sperm whale	*Physeter macrocephalus*	E
Plants		
Johnson's seagrass	*Halophila johnsonii*	T

3.1 Species Not Likely to be Adversely Affected

NMFS has analyzed the routes of potential project effects in the marine environment on five species of sea turtles (loggerhead, Kemp's ridley, leatherback, hawksbill, and green), smalltooth sawfish, humpback whales, and sperm whales from the proposed action. We have determined the potential routes of effects to sea turtles and smalltooth sawfish include (1) injury or death from potential interactions with and operation of dredges, blasting, and bed-leveling, and (2) avoidance of the area during construction operations due to disturbance caused by blasting, dredging, leveling, construction, and placement of dredged materials in the various disposal sites in the nearshore disposal site, Palm Beach Harbor ODMDS, and the inshore mitigation site. Additional impacts to nesting sea turtles could occur from the placement of dredged material within the nearshore disposal area. Loss of foraging habitat along the channel side slopes could also affect sea turtles. The potential routes of effects to whales include injury or death from potential interactions with hopper dredges during dredging and disposal of dredged material in the Palm Beach Harbor ODMDS, injury or death from potential blasting at the end of the entrance channel, and temporary avoidance of areas during construction. Of these, only interactions with hopper dredges have the potential for adverse effects and only for certain turtle species, as discussed below and in the Effects of the Action section. The routes of potential effects to Johnson's seagrass include removal by dredging during the widening and the deepening of the navigational channel.

Humpback Whales

Humpback whales may be found in or near the action area. These species are generally found seaward of the continental shelf, and would only be in the action area during migrations to and from breeding grounds. However, because the Gulf Stream comes in so close off Palm Beach County, it is possible that these whales could stray into the project area. NMFS has analyzed the routes of potential effects on humpback whales from the proposed action and, based on our analysis, determined that potential effects are limited to the following: injury from potential interactions with construction (i.e., dredging) equipment (e.g., a hopper dredge vessel striking a whale), injury from use of explosives, and temporary avoidance of the area during construction

[3] Green turtles are listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are listed as endangered
4 U.S. DPS.

operations The USACE will require the contractor to follow the aforementioned blasting safety conditions (page 5). The blasting or transporting of dredged material to the ODMDS would be temporary impacts and would not be a daily occurrence of the project. In addition, whales do not use this area throughout the year and would most likely be migrating. Therefore, given the low likelihood of seasonal-only presence of this species in the project area, and the required mitigation measures, NMFS concludes that the project's construction blasting effects are discountable. In addition, the hopper dredge crew and contractors will be required to abide by NMFS's Vessel Strike Avoidance and Reporting guidelines and the hopper dredge will also be required to have NMFS-approved endangered species observers aboard. With implementation of these conservation measures, NMFS believes that the likelihood of a humpback whale being struck by a dredge vessel is discountable, and that all construction related effects to humpback whales are discountable.

Sperm Whales
Sperm whales are predominantly found seaward of the continental shelf and are not expected to be found within the shallow waters inshore of the outer reef nor at the ODMDS. Therefore, we believe the risk to sperm whales from blasting or dredging impacts, including potential collision with a dredge vessel enroute to or from the ODMDS, is discountable.

Smalltooth Sawfish
Smalltooth sawfish may be found in or near the action area. However, any smalltooth sawfish found in the area would most likely be an adult moving through the area in search of foraging habitat. Since there is no foraging habitat available in the areas to be dredged, it is most likely that adult sawfish would not linger within the action area and would only be passing through. There has only been one incidence of a sawfish being reported in the area (NMFS 2000). Juvenile smalltooth sawfish would not be found in the project area since there is no foraging or resting habitat available for them. The implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions* should reduce any risk.

NMFS has identified the following potential effects to smalltooth sawfish, and concluded they are not likely to be adversely affected by the proposed action. Effects to smalltooth sawfish include the risk of injury from dredging/leveling activities and they may also be affected by blasting. Underwater explosions produce a pressure waveform with rapid oscillations from positive pressure to negative pressure that results in rapid volume changes in gas-containing organs. In fish, the swimbladder, a gas-containing organ, is the most frequently damaged organ (Christian 1973; Falk and Lawrence 1973, Kearns and Boyd 1965; Linton et al. 1985a; Yelverton et al. 1975). It is subject to rapid contraction and overextension in response to the explosive shock waveform (Wiley et al. 1981). However, species lacking swimbladders (like smalltooth sawfish) or with small swimbladders are highly resistant to explosive pressures (Alpin 1947; Fitch and Young 1948; Goertner et al. 1994). The planned test blasts should also cause any sawfish in the area to leave. Due to the species' mobility, the low probability that sawfish would be present, the avoidance reaction to test blasts, the lack of a swim bladder, and the implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, the risk of injury will be discountable. Smalltooth sawfish may be affected by being temporarily unable to use the site due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant.

Disturbance from construction activities and related noise will be intermittent and only for part of the construction period; turbidity curtains will only enclose small areas at any one time in the project area, will be removed upon completion, and will not appreciably interfere with use of the area by sea turtles and sawfish.

Sea Turtles

Dredge Vessel Collisions
NMFS believes that the possibility that the hopper dredge vessel(s) will collide with and injure or kill sea turtles during dredging and/or sand pumpout operations is discountable, given the vessel's slow speed, the ability of these species to move out of the way, and anticipated avoidance behavior by sea turtles at the sea surface or in the water column.

Mechanical (Clamshell/Bucket Dredges) and/or Cutterhead Dredging
The project may affect sea turtles by injury or death as a result of interactions with equipment or materials used during dredging; however, NMFS believes the chance of injury or death from interactions with clamshell/bucket and/or hydraulic cutterhead dredging equipment is discountable as these species are highly mobile and are likely to avoid the areas during construction. NMFS has previously determined that non-hopper-type dredging activities, including mechanical-type dredges such as cutterhead and clamshell dredges, are not likely to adversely affect sea turtles, primarily because they are noisy and slow moving, and they only affect very small areas at a time, enabling sea turtles to detect and avoid them. Stranding data suggests that cold-stunned turtles may be taken by cutterhead dredges while they are lethargic or dying; however, this possibility is rare and discountable. To further reduce this risk, NMFS has recommended that cutterhead dredging be done in warmer months and that it is delayed until after cold snaps: however, this recommendation is not applicable to this project because there should not be any cold-stunned turtles in the project area since the project is located in south Florida. NMFS has received just one report of a healthy sea turtle take by clamshell dredge in the southeastern United States over the past 20+ years. Thus, NMFS believes the likelihood of a sea turtle being taken by a clamshell or cutterhead dredge in the proposed action area is discountable.

Dredged Material Placement Materials dredged from the channel expansion areas will be either placed at the nearshore disposal site, taken to the Palm Beach Harbor ODMDS, or beneficially used at the mitigation sites. NMFS believes these activities are not likely to adversely affect sea turtles because these species are either unlikely to be in the very-shallow, nearshore construction area where sand is being deposited, or will avoid the dumping of dredged materials as they are placed within the ODMDS or mitigation areas. NMFS does not expect an injury from, nor has ever received a report of an injury to a sea turtle resulting from, burial in, or impacts from, hopper-dredge-released sediments, neither from inshore or offshore disposal sites, anywhere the USACE conducts dredged material disposal operations. Sea turtles are highly mobile and apparently are able to avoid a descending sediment plume discharged at the surface by a hopper dredge opening its hopper doors, or pumping its sediment load over the side. Even if temporarily enveloped in a sediment plume, NMFS believes the possibility of injury, or burial of normal, healthy sea turtles by dredged material (i.e., sand and silt) disposal, is discountable or its effects insignificant. NMFS's *Sea Turtle and Smalltooth Sawfish Construction Guidelines* will also be implemented as a condition of the USACE's permit, which will further reduce the potential of interactions with sea turtles from sand placement activities.

Adult green sea turtles, loggerheads, and leatherbacks are unlikely to be found associated with relatively nearshore areas except during nesting season. No beach placement of dredged material would occur from May 1 through October 31, the primary sea turtle nesting season. If beach placement activities were to occur outside of this time frame but still within potential sea turtle nesting (March 1 to May 15 and November 1 to November 30), sea turtle monitoring and nest relocation would be performed in accordance with the Biological Opinion of the USFWS for this project. Thus, there would be no hatchlings emerging into the marine environment of the project area.

Post-Dredging Bed-Leveling Activities

The project may affect sea turtles by injury or death as a result of interactions with bed-leveling equipment used after dredging; however, NMFS believes the chance of injury or death from interactions with bed-leveler equipment is discountable because (1) these species are highly mobile; (2) bed-levelers move considerably slower than hopper dredges; and (3) bed-levelers do not use suction.

Bed-leveling does not use suction; it redistributes sediments, rather than removing them. Plows, I-beams, or other seabed-leveling mechanical dredging devices are often used for cleanup operations, i.e., to lower high spots left in channel bottoms and dredged material deposition areas by hopper dredges or other type dredges. Leveling devices typically weigh about 30 to 50 tons, are fixed with cables to a derrick mounted on a barge pushed or pulled by a tugboat at about one to two knots. Some evidence indicates that bed-leveling devices may be responsible for occasional sea turtle mortalities; however, the evidence is inconclusive (M. Dodd, Georgia Department of Natural Resources, pers. comm. to K. Davy, NMFS, 2012). Sea turtles may be crushed as the leveling device passes over a turtle that fails to move or is not pushed out of the way by the sediment "wave" generated by and pushed ahead of the device.

To evaluate the use of bed-levelers and potential impacts to sea turtles, the Savannah District USACE conducted a study during 2013 and concluded bed-levelers do not harm sea turtles. A follow-up study to repeat the procedure and confirm the results is scheduled for 2014. All things considered, therefore, the use of bed-levelers is probably preferable (less likely to result in sea turtle interactions) to the use of hopper dredges for cleanup operations, since turtles foraging, resting, or brumating on irregular bottoms are probably more likely to be entrained by suction dragheads than crushed by bed-levelers, because (1) sea turtle deflector dragheads are less effective on uneven bottoms; (2) hopper dredges move considerably faster than bed-levelers; and (3) bed-levelers do not use suction. Furthermore, their use would be restricted to the leveling of high spots in the channel, where the use of a hopper dredge for such work would be expected to result in equal or greater take of endangered species. NMFS believes it is unlikely that turtles may be adversely affected by potential bed-leveling activities during "high-spot cleanup" during the proposed action. However, if injurious or lethal bed-leveler interactions appear to have occurred, based on reports of stranded turtles, they shall be immediately reported to NMFS, and reinitiation of consultation will be required. Any such takes shall not be counted against the total lethal takes allowed by the Incidental Take Statement of this opinion.

Hopper Dredging Impacts
The USACE has stated that if they must use a hopper dredge, the terms and conditions of the SARBO will be applied to the project because hopper dredges are known to entrain, crush, and kill sea turtles that encounter the dredge's trailing suction dragheads. Effects of disorientation to sea turtles and hatchlings from shipboard lighting installed on dredges are also discountable for projects such as the proposed action since the project actions will be occurring outside of nesting season for sea turtles, and any nests with eggs will be moved out of the action area so hatchlings will not be present. The applicant's compliance with NMFS's March 23, 2006, *Sea Turtle and Smalltooth Sawfish Construction Conditions* will reduce the potential for interactions with sea turtles from the project.

<u>Leatherbacks</u>:
NMFS believes the routes of effects from the potential use of a hopper dredge and blasting may affect, but are not likely to adversely affect, leatherback sea turtles. Leatherback sea turtles tend to be open ocean foragers and are uncommon in shallow nearshore waters, except during nesting season or during times when they may come in towards shore to feed on aggregations of jellyfish. Therefore, they are unlikely to be impacted by the dredging associated with the proposed action.

There has never been a reported take of a leatherback by a hopper dredge used by the USACE or the dredging industry and this may be because the typical leatherback would be as large as or larger than the large, industry-standard California-type hopper dredge trailing-suction draghead, making leatherbacks unlikely to be entrained. Additionally, the California-type draghead design and level position during dredging (as opposed to more upright positioning of other dredge types), makes it less likely to entrain larger sea turtles (Studt 1987). Lastly, in over 32 years of observer-monitored hopper dredging projects in Jacksonville District, only one leatherback has ever been reported as lethally taken or observed, and that was in a relocation trawl. Relocation trawling associated with the use of hopper dredges has the potential to capture leatherbacks. From FY 2006-2013 in the Gulf of Mexico and South Atlantic regions combined, seven leatherback turtles were non-lethally captured in relocation trawls, out of a total of 1,284 turtles captured and many thousands of hours of trawling (USACE Sea Turtle Warehouse database, October 2013). Five of the seven leatherback captures occurred in the Gulf of Mexico. While these captures are considered take, the infrequent capture of this species suggests an extremely low likelihood of an encounter with project actions. Leatherback turtles will not be considered further in this opinion based on the low likelihood of their presence in the areas where hopper dredges may be used for the project, and their non-benthic feeding habits, which combine to produce a discountable risk of hopper dredge interaction.

<u>Hawksbills</u>:
NMFS believes the routes of effects from the potential use of a hopper dredge may affect, but is not likely to adversely affect, hawksbill sea turtles. Hawksbill life history consists of an open ocean stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988; Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where immature turtles reside and grow) in coastal waters, which may include inlets, bays, seagrass areas, coastal lagoons,

coral reefs, and hardbottom habitats. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hardbottom communities and mangrove-fringed bays may occasionally be occupied. Adult hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Díez 1998). Hawksbills have a specialized diet consisting primarily of sponges (Meylan 1988), although other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (León and Díez 2000; Mayor et al. 1998; van Dam and Díez 1997). The limited hardbottom habitat that exists in the action area is not likely to be utilized by hawksbills, and they are unlikely to forage in the sand and rock located in the project area. In addition, over 32 years of observer-monitored hopper dredging projects in the Jacksonville District, no hawksbills have ever been reported as taken or observed by the dredge. Therefore, NMFS believes it is unlikely that hawksbill sea turtles will be present in the action area. Based on the above discussion, we consider the potential for impacts to hawksbill sea turtles to be discountable, and this species will not be discussed further in this opinion.

Kemp's ridleys:
NMFS believes the routes of effects from the potential use of a hopper dredge may affect, but are not likely to adversely affect, Kemp's ridley sea turtles because they have not been encountered during the past 20 years of annual hopper dredging in the action area. Only one Kemp's ridley has ever been reported taken by a hopper dredge working in south or central Florida's east coast during the past 33 years. Sea turtle interactions with hopper dredges within the action area have resulted in 11 takes of other sea turtles [three greens and eight loggerheads] since 1994). This species has a very restricted range relative to other sea turtle species with most adults occurring in the Gulf of Mexico in shallow near shore waters, although adult-sized individuals sometimes are found on the eastern seaboard of the United States as well. Nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in the Mexican state of Tamaulipas, although few nests have also been recorded in Florida and the Carolinas (Meylan et al. 1995). Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Henwood and Ogren 1987, Lutcavage and Musick 1985, Ogren 1989). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Epperly et al. 1995c, Epperly et al. 1995b, Musick and Limpus 1997). Adult Kemp's ridleys primarily occupy neritic habitats, typically containing muddy or sandy bottoms where prey can be found. In the post-pelagic stages, Kemp's ridley sea turtles are largely cancrivorous (crab eating), with a preference for portunid (swimming) crabs (Bjorndal 1997). Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be scavenged discards from the shrimping industry (Shaver 1991). Kemp's ridley sea turtles will not be considered further in this opinion based on the improbability of their presence in the action area and a very low likelihood of an encounter with a hopper dredge.

Blasting Impacts
For all turtle species, potential routes of effects from the use of rock pre-treatment techniques and blasting are not likely to result in adverse effects for the following reasons:

1. Blasting mitigative procedures as proposed by the USACE are detailed in Section 2.1. Test blasts will be performed prior to the actual project blasting. Observers will also be stationed to observe for endangered species prior to test and project blasts. Test blasts are expected to cause sea turtles to exit from the project area with at most insignificant behavioral modifications.

   Studies have shown that stemmed blasts have up to a 60 to 90 percent decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Hempen et al. 2007; Hempen et al. 2005; Nedwell and Thandavamoorthy 1992). However, unlike open water blasts, very little documentation exists on the effects that confined blasting can have on marine animals near the blast (Keevin et al. 1999). The blast mitigation procedures detailed above, in particular the rigorous observer program, have been successfully used in several recent USACE projects (i.e., San Juan Harbor, Puerto Rico in 1994, Miami Harbor in 2005, and Wilmington Harbor in 2012). Since these procedures have been successfully used in several recent projects without incident, it is our continued judgment that they provide sufficient protections to sea turtles, and thus the effects from blasting are discountable.

Table 1. Interim noise exposure thresholds for fish and sea turtles.

Effect	Organism	Threshold Level
Injury	All fish and sea turtles	206 dB peak
	Fish ≥ 2 grams and turtles	187 dB (SEL)
	Fish < 2 grams	183 (SEL)
Behavior	Fish	150 dB (RMS)
	Sea turtles	160 dB (RMS)

Thresholds are based on the most conservative criteria for hearing generalists for fish (Federal Highway Administration 2012). No data on sea turtle thresholds are available and fish thresholds are recommended for interim use[5,6].

Since the USACE will require the contractor to adhere to the aforementioned safety conditions for blasting, NMFS believes that the effects on sea turtles and sawfish from blasting will be insignificant.

Habitat Impacts – Loss of Habitat and Avoidance.
Sea turtles may be affected by being temporarily unable to use potential foraging sites within the overall project area due to potential avoidance of construction activities and related noise, and

[5] McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhita, J. Murdoch, and K. McCabe. 2000a. Marine seismic surveys: analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid. A Report Prepared for the Australian Production Exploration Association. Project CMST 163, Report R99-15. 198 pp.

[6] McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhita, J. Murdoch, and K. McCabe. 2000b. Marine seismic surveys: A study of environmental implications. APPEA Journal. p. 692-708.

physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. Disturbance from construction activities and related noise will be intermittent and only for part of the construction period; turbidity curtains will only enclose small areas at any one time in the project area, will be removed upon completion, and will not appreciably interfere with use of the area by sea turtles

The widening and deepening will also remove several acres of foraging habitat for sea turtles; however, the project area is surrounded by abundant seagrass meadows and the channel slopes will be recolonized by epifauna and flora once the dredging has concluded. Therefore, there will be insignificant effects from permanent loss of habitat that may have been used for foraging by sea turtles.

3.2 Status of Species Likely to be Adversely Affected

3.2.1 Status of Green Sea Turtles

The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations that were listed as endangered. Critical habitat for the green sea turtle was designated on September 2, 1998, for the waters surrounding Isla Culebra, Puerto Rico, and its associated keys. No critical habitat exists in the action area for this consultation.

Green sea turtle

Species Description, Distribution, and Population Structure
Green sea turtles have a smooth carapace with four pairs of lateral (or costal) scutes and a single pair of elongated prefrontal scales between the eyes. They typically have a black dorsal surface and a white ventral surface although the carapace of green sea turtles in the Atlantic Ocean has been known to change in color from solid black to a variety of shades of grey, green, brown, and black in starburst or irregular patterns.

Green sea turtles are distributed circumglobally, mainly in waters between the northern and southern 20°C isotherms (Hirth 1971) and nesting occurs in more than 80 countries worldwide (Hirth and USFWS 1997). The two largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia. The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina as well as the USVI and Puerto Rico (NMFS and USFWS 1991a, Dow et al. 2007). However, the vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 Recovery Plan for the Atlantic Green Turtle (NMFS and USFWS 1991a) or the 2007 Green Sea Turtle 5-Year Status Review (NMFS and USFWS 2007b).

In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are found in inshore and nearshore waters from Texas to Massachusetts. Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon system in Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997). Additional important foraging areas in the western Atlantic include the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, scattered areas along Colombia and Brazil (Hirth 1971), and the northwestern coast of the Yucatán Peninsula.

Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs (Hays et al. 2001) and, like loggerheads, are known to migrate from northern areas in the summer back to warmer waters of the south in the fall and winter to avoid seasonally cold seawater temperatures. In terms of genetic structure, regional subpopulations show distinctive mitochondrial DNA properties for each nesting rookery (Bowen et al. 1992, Fitzsimmons et al. 2006). Despite the genetic differences, green sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. However, such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green turtle populations occurring worldwide (Dutton et al. 2008).

Life History Information

Green sea turtles exhibit particularly slow growth rates [about 1-5 cms per year (Green 1993, McDonald-Dutton and Dutton 1998)] and have one of the longest ages to maturity of any sea turtle species [i.e., 20-50 years (Chaloupka and Musick 1997, Hirth and USFWS 1997)]. The slow growth rates are believed to be a consequence of their largely herbivorous, low-net energy diet (Bjorndal 1982). Upon reaching sexual maturity, females begin returning to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982, Frazer and Ehrhart 1985) and are capable of migrating significant distances (hundreds to thousands of kilometers) between foraging and nesting areas. While females lay eggs every 2-4 years, males reproduce every year (Balazs 1983).

Green sea turtle mating occurs in the waters off nesting beaches. In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989). During the nesting season, females nest at approximately two-week intervals, laying an average of 3-4 nests (Johnson and Ehrhart 1996). The number of eggs per nest varies among subpopulations, but the average nest size is around 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989), which will incubate for approximately two months before hatching. Survivorship at any particular nesting site is greatly influenced by the level of human-caused stressors. More pristine and less disturbed nesting sites (e.g., Great Barrier Reef in Australia) show higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicaragua) (Campbell and Lagueux 2005, Chaloupka and Limpus 2005). After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this period, they feed close to the surface on a variety of marine algae and other life associated with drift lines and other debris. This early oceanic phase remains one of the most poorly understood aspects of green sea turtle life history (NMFS and USFWS 2007b). However, at approximately 20- to 25-cm carapace length, juveniles leave pelagic habitats and enter benthic foraging habitats. Growth studies using skeletochronology indicate that green sea turtles in the Western Atlantic shift from the oceanic phase to nearshore development habitats (protected lagoons and open coastal areas rich in sea grass and marine algae) after approximately 5-6 years (Zug and Glor 1998, Bresette et al. 2006). As adults, they feed almost exclusively on seagrasses and algae in shallow bays, lagoons, and reefs (Rebel and Ingle 1974) although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds and it is clear they are capable of "homing in" on these sites if displaced (McMichael et al. 2003). Based on flipper tagging and/or satellite telemetry studies, the majority of adult female Florida green sea turtles are believed to reside in nearshore foraging areas throughout the Florida Keys from Key Largo to the Dry Tortugas and in the waters southwest of Cape Sable, Florida, with some post-nesting turtles also residing in Bahamian waters as well (NMFS and USFWS 2007b).

Abundance and Trends
A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007a) in which the authors collected and organized abundance data from 46 individual nesting concentrations organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). The authors were able to determine trends at 26 of the 46 nesting sites and found that 12 appeared to be increasing, ten appeared to be stable, and four appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution since trend data was only available for about half of the total nesting concentration sites examined in the review and that site specific data availability appeared to vary across all regions.

The western Atlantic region (focus of this opinion) was one of the best performing in terms of abundance in the entire review, as there were no sites that appeared to be decreasing. The 5-year status review for the species identified eight geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean and reviewed the trend in nest count data for each (NMFS and USFWS 2007b). These sites include (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Archipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either site (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for eight sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic. However, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species (see NMFS and USFWS 2007a).

By far, the largest known nesting assemblage in the western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts as well as documented emergences (both nesting and nonnesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. For instance, from 1971-1975 there were approximately 41,250 average emergences documented per year and this number increased to an average of 72,200 emergences documented per year from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 females per year (NMFS and USFWS 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9 percent annually. The number of females nesting per year on beaches in the Yucatán, Aves Island, Galibi Reserve, and Isla Trindade number in the hundreds to low thousands, depending on the site (NMFS and USFWS 2007a). In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994, Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf coast of Florida as well as the beaches on the Florida Panhandle (Meylan et al. 1995). In 2013, a total of 40 nests were found in North Carolina, five nests in South Carolina, and three nests in Georgia (nesting databases maintained on www.seaturtle.org). Increased nesting has also been observed along the Atlantic coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989 up until recently, the pattern of green turtle nesting has shown biennial peaks in abundance with a generally positive trend during the ten years of regular monitoring. According to data collected from Florida's index nesting beach survey from 1989-2011, green turtle nest counts across Florida have increased approximately tenfold from a low of 267 in the early 1990s to a high of 10,701 in 2011, although the numbers were lower in 2012. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008 and dropped under 3,000 in 2009, at first causing some concern, but 2010 saw an increase back to 8,426 nests on the index nesting beaches and then the high of 10,701was measured in 2011 (FWC Index Nesting Beach Survey Database). Modeling by Chaloupka and Balazs (2007) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9 percent.

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas of the southeastern United States, where they come to forage. Ehrhart et al. (2007) have documented a significant increase in in-water abundance of green turtles in the Indian River Lagoon area. It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero.

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. There are also significant and ongoing threats to green sea turtles from human-related causes in the United States. Similar to that described in more detail previously for loggerhead sea turtles, these threats include global climate change, beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, interactions with fishing gear, and oils spills.

On April 20, 2010, while working on an exploratory well approximately 50 miles offshore Louisiana, the semi-submersible drilling rig Deepwater Horizon (DWH) experienced an explosion and fire. The rig subsequently sank and oil and natural gas began leaking into the Gulf of Mexico. Oil flowed for 86 days, until finally being capped on July 15, 2010. Millions of barrels of oil were released into the Gulf. Additionally, approximately 1.84 million gallons of chemical dispersant was applied both subsurface and on the surface to attempt to break down the oil. There is no question that the unprecedented DWH event and associated response activities (e.g., skimming, burning, and application of dispersants) have resulted in adverse effects on listed species.

At this time, the total effects of the oil spill on listed species found throughout the Gulf of Mexico are not known. Potential DWH-related impacts to species include direct oiling or contact with dispersants from surface and subsurface oil and dispersants, inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, loss of foraging resources which could lead to compromised growth and/or reproductive potential, harm to foraging, resting and/or nesting habitats, and disruption of nesting turtles and nests. There is currently an ongoing investigation and analyses being conducted under the Oil Pollution Act (33 U.S.C. 2701 et seq.) to assess natural resource damages and to develop and implement a plan for the restoration, rehabilitation, replacement or acquisition of the equivalent of the injured natural resources. The final outcome of that investigation may not be known for many months to years from the time of this biological opinion. Consequently, other than some emergency restoration efforts, most restoration efforts that occur pursuant to the Oil Pollution Act have yet to be determined and implemented, and so the ultimate restoration impacts on the species are unknowable at this time.

During the response phase to the DWH oil spill (April 26 – October 20, 2010) a total of 201 (172 alive and 29 dead) green sea turtles were recovered, either as strandings (dead or debilitated generally onshore or nearshore) or were collected offshore during sea turtle search and rescue operations. The mortality number of green sea turtles is lower than that for loggerheads despite loggerheads having far fewer total strandings, but this is because the majority of green sea turtles came from the offshore rescue (pelagic stage), of which almost all survived after rescue, whereas a greater proportion of the loggerhead recoveries were nearshore neritic stage individuals found dead. While green sea turtles regularly use the northern Gulf of Mexico, they have a widespread distribution throughout the entire Gulf of Mexico, Caribbean, and Atlantic. As described above, nesting is relatively rare on the northern coast of the Gulf of Mexico. Therefore, although green sea turtles likely suffered adverse impacts from the DWH spill, a relatively small proportion of the population is expected to have been exposed to and directly impacted by the spill.

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

The most recent Intergovernmental Panel on Climate Change (IPCC 4th Assessment Report 2007) models air temperature increases for the 21st century at between 2.4° to 6.4°C (7.2 F with a likely range of 4.3° to 11.5 F). Although data shows that most oceans are being affected already by climate changes, especially rising sea temperatures, modeling this is more problematic due to a number of complicated and interconnected factors (Lawler et al. 2010), but sea surface temperatures are likely to rise significantly (1° to 3°C) in the 21st century as well. Climate change impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty; however significant impacts to the hatchling sex ratios of turtles may result (NMFS and USFWS 2007c). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25° to 35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c). The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006, Poloczanska et al. 2009).

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc., which could ultimately affect the primary foraging areas and foraging success of sea turtles.

Fibropapillomatosis disease is an increasing threat to green sea turtles. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991). All sea turtles are susceptible to cold stunning; however, for unknown reasons, green sea turtles appear to be the most susceptible sea turtle species. During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, with hundreds found dead or dying. A large cold-stunning event occurred in the western Gulf of Mexico in February 2011, resulting in approximately 1,650 green turtles being found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding and approximately 1,030 were rehabilitated and released. Additionally, during this same time frame, approximately 340 green turtles were found cold-stunned in Mexico, with approximately 300 of those reported as being subsequently released.

3.2.2 Status of Loggerhead Sea Turtles

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule designating nine DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011; effective October 24, 2011). The DPSs established by this rule include: (1) Northwest Atlantic Ocean (threatened); (2) Northeast Atlantic Ocean (endangered); (3) South Atlantic Ocean (threatened); (4) Mediterranean Sea (endangered); (5) North Pacific Ocean (endangered); (6) South Pacific Ocean (endangered); (7) North Indian Ocean (endangered); (8) Southeast Indo-Pacific Ocean (endangered); and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic DPS (NWA DPS) is the only one that occurs within the action area and therefore is the only one to be considered in this opinion. In addition, the recently proposed listing of critical habitat for the Northwest Atlantic DPS (NWA DPS) occurs within the action area (Figure 5). More specifically, the area is classified as nearshore reproductive habitat.

Loggerhead Sea Turtle

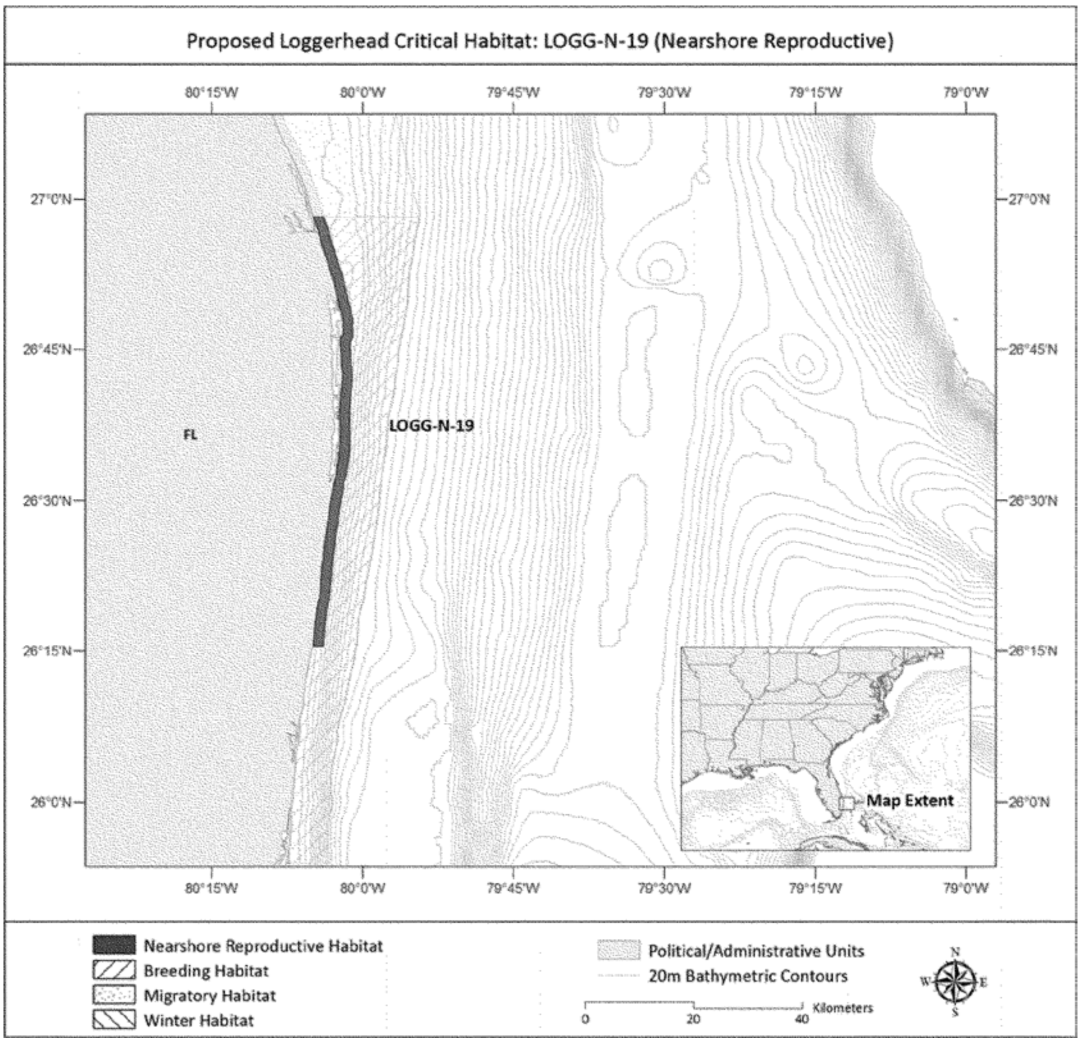

Figure 5. Proposed Loggerhead Critical Habitat that includes the Action Area.

Nearshore reproductive habitat includes habitat for the hatchling swim frenzy and for females during the internesting period from the shoreline (mean high water seaward one mile). This nearshore zone is a vulnerable, pivotal transitional habitat area for hatchling transit to open waters, and for nesting females to transit back and forth between open waters and nesting beaches during their multiple nesting attempts throughout the nesting season. The habitat characteristics of this nearshore zone are important in female nest site selection and successful repeat nesting. In addition to nesting beach suitability and proximity to nearshore oceanic currents needed for hatchling transport, habitat suitable for transit between the beach and open waters by the adult female turtle is necessary. Nesting females typically favor beach approaches with few obstructions or physical impediments such as reefs or shallow water rocks, which may make the entrance to nearshore waters more difficult or even injure the female as she attempts to reach the surf zone (Salmon 2006). The primary constituent elements (PCEs) of the nearshore reproductive habitat include (1) Nearshore waters directly off the highest density nesting beaches as identified in 78 FR 18000 (March 25, 2013) to one mile offshore; (2) Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and (3) Waters with minimal manmade structures that could promote predators (i.e., nearshore predator concentration caused by submerged and emergent offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents. Based on the description of these PCEs, there does not seem to be any project impacts that would prevent sea turtles from having full use of the nearshore reproductive habitat (as the project would avoid nesting season).

Species Description, Distribution, and Population Structure
Loggerheads are large sea turtles with the mean straight carapace length of adults in the southeast U.S. being approximately 92 cm. The corresponding mass is approximately 116 kg (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, five pairs of costals, five vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 1988).

As discussed in more detail below, the loggerhead NWA DPS inhabits continental shelf and estuarine environments and occurs throughout the temperate and tropical regions of the Atlantic. Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, and the Bahamas, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico (Ehrhart 1989, NMFS and FWS 2008). Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches. Aerial surveys suggest that loggerheads in U.S. waters are distributed as a whole in the following proportions: 54 percent in the southeast U.S. Atlantic, 29 percent in the northeast U.S. Atlantic, 12 percent in the eastern Gulf of Mexico, and five percent in the western Gulf of Mexico (TEWG 1998). As oceanic juveniles, loggerheads from the Northwest Atlantic use the North Atlantic gyre and often are associated with *Sargassum* communities (Carr 1986); they also are found in the Mediterranean Sea. In the western Mediterranean, they tend to be associated with the waters off the northern African coast and the northeastern Balearic archipelago, areas generally not inhabited by turtles of Mediterranean origin. As larger, neritic juveniles, they show more structure and tend to inhabit areas closer to their natal origins (Bowen et al. 2004), but some do move to and from oceanic foraging grounds throughout this life stage (McClellan and Read 2007), and some continue to use the Mediterranean Sea (Casale et al. 2008b, Eckert et al. 2008).

Shallow water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads while juveniles are also found in enclosed, shallow water estuarine environments not frequented by adults (Epperly et al. 1995c). Further offshore, adults primarily inhabit continental shelf waters, from New England south to Florida, the Caribbean, and Gulf of Mexico (Schroeder et al. 2003). Benthic, immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool and then migrate back northward in spring (Epperly et al. 1995c; Keinath 1993; Morreale and Standora 1998; Shoop and Kenney 1992).

Prior to listing the NWA DPS as a separate species, Section 7 analyses evaluated project effects on five subpopulations based on female nesting along the Northwest Atlantic coast, divided geographically as follows: (1) a Northern nesting subpopulation, occurring from North Carolina to Northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota on the west coast; (3) a Northwest Florida nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the Eastern Yucatán Peninsula, Mexico (Márquez M 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS-SEFSC 2001). The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded, based on recent advances in genetic analyses, that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula and that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia); (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida); (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida); (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas); and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

Life History Information

Loggerhead sea turtles reach sexual maturity between 20 and 38 years of age, although this varies widely among populations (Frazer and Ehrhart 1985; NMFS - SEFSC 2001). The annual mating season for loggerhead sea turtles occurs from late March to early June, and eggs are laid throughout the summer months. Female loggerheads deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984) and have an average remigration interval of 3.7 years (Tucker 2010). Mean clutch size varies from 100 to 126 eggs for nests occurring along the southeastern U.S. coast (Dodd 1988).

Loggerheads originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for a period as long as 7-12 years (Bolten et al.

1998). Stranding records indicate that when immature loggerheads reach 40-60 centimeters straight carapace length, they begin to occur in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002). Recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or move back and forth between pelagic and coastal habitats interchangeably (Witzell 2002).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with Sargassum habitats, driftlines, and other convergence zones (Carr 1986) (Witherington 2002). Juveniles are omnivorous and forage on crabs, mollusks, jellyfish and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily found in coastal waters and prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Abundance and Trends
A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS-SEFSC 2009b; NMFS and SEFSC 2001; NMFS and USFWS 2008; TEWG 1998; TEWG 2000; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. However, nesting beach surveys can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of females turtles, as long as such studies are sufficiently long and effort and methods are standardized [see e.g., NMFS and USFWS (2008)]. NMFS and USFWS (2008) concluded that the lack of change in two important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population. Analysis of available data for the Peninsular Florida Recovery Unit up through 2008 led to the conclusion that the observed decline in nesting for that unit could best be explained by an actual decline in the number of adult female loggerheads in the population (Witherington et al. 2009).

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources (GDNR) unpublished data, North Carolina Wildlife Resources Commission unpublished data, South Carolina Department of Natural Resources (SCDNR) unpublished data), and represent approximately 1,272 nesting females per year [4.1 nests per female (Murphy and Hopkins 1984)]. The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3 percent annually. Nest totals from aerial surveys conducted by SCDNR showed a 1.9 percent annual decline in nesting in South Carolina from 1980 through 2008. Overall, there is strong statistical data to suggest the NRU has experienced a long-term decline. Data in 2008 showed improved nesting numbers. In 2008, 841 loggerhead nests were observed compared to the 10-year average of 715 nests in North Carolina. The number dropped to 276 in 2009, but rose again in 2010 (846 nests) and has slightly risen each year to 1,160 nests in 2013. In South Carolina, 2008 was the seventh highest nesting year on record since 1980, with 4,500 nests. Nesting dropped in 2009 to 2,183, but has steadily increased with numbers now reaching 4,927 nests in 2013. Georgia beach surveys located a total of 1,648 nests in 2008. This number surpassed the previous statewide record of 1,504 nests in 2003. In 2009, the number of nests declined to 998, and in 2010, a new statewide record was established with 1,760 loggerhead nests and the numbers have been steadily increasing with each year breaking the previous record. In 2013, there have been 2,249 loggerhead nests reported on Georgia's beaches. (GDNR, NCWRC, and SCDNR nesting data located at www.seaturtle.org).

Another consideration that may add to the importance and vulnerability of the NRU is the sex ratio of this subpopulation and its potential importance for genetic diversity. Research conducted over a limited timeframe but across multiple years found that while the small Northern subpopulation can produce a larger proportion of male hatchlings than the large Peninsular Florida subpopulation, the sex ratio is female biased. In most years, the extent of the female bias is likely to be less extreme based upon current information. However, because their absolute numbers are small, their contribution to overall hatchling sex ratios is small (Wyneken et al. 2004; Wyneken et al. 2012). Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the Northern subpopulation is related to the number of female hatchlings that are produced. Fewer females will limit the number of subsequent offspring produced by the subpopulation.

The Peninsular Florida Recovery Unit (PFRU) is by far the largest loggerhead nesting assemblage in the Northwest Atlantic and as such drives the overall nesting trend for the NWA DPS. The statewide estimated total for 2012 was 98,601 (FWRI nesting database).

In 2009, index nesting beach levels, while still higher than the lows of 2004, 2006, and 2007, dropped below 2008 levels to approximately 32,717 nests, but in 2010 a large increase was seen, with 47,880 nests on the index nesting beaches and an increase to 58,172 nests on index beaches in 2012 (FWRI nesting database).

The remaining three recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages but still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004 (although the 2002 year was missed). Nest counts ranged from 168-270, with a mean of 246, but with no detectable trend during this period (NMFS and USFWS 2008). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a significant declining trend of 4.7 percent annually (NMFS and USFWS 2008). Nesting on Florida's northwest index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Similarly, nesting survey effort has been inconsistent among the GCRU nesting beaches and no trend can be determined for this subpopulation. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

Determining the meaning of the long-term nesting decline data is confounded by the results of various in-water research that suggests the abundance of neritic juvenile loggerheads is steady or increasing. Ehrhart et al. (2007) found no significant regression-line trend in the long-term dataset. However, notable increases in recent years and a statistically significant increase in catch per unit effort (CPUE) of 102.4 percent from the 4-year period of 1982-1985 to the 2002-2005 periods were found. Epperly et al. (2007) determined the trends of increasing loggerhead catch rates from all the aforementioned studies in combination provide evidence there has been an increase in neritic juvenile loggerhead abundance in the southeastern United States in the recent past. A study led by the South Carolina Department of Natural Resources (SAFMC 2009b) found that standardized trawl survey CPUEs for loggerheads from South Carolina to North Florida was 1.5 times higher in summer 2008 than summer 2000. However, even though there were persistent inter-annual increases from 2000-2008, the difference was not statistically significant, likely due to the relatively short time series. Comparison to other datasets from the 1950s through 1990s showed much higher CPUEs in recent years regionally and in the South Atlantic Bight, leading SCDNR to conclude that it is highly improbable that CPUE increases of such magnitude could occur without a real and substantial increase in actual abundance (Arendt et al. 2009). Whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence is not clear. NMFS and USFWS (2008), citing (Bjorndal et al. 2005), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest Stage III individuals (oceanic/neritic juveniles, historically referred to as small benthic juveniles), which could indicate a relatively large cohort that will recruit to maturity in the near future (TEWG 2009). However, in-water studies throughout the eastern United States also indicate a substantial decrease in the abundance of the smallest Stage III loggerheads, a pattern also corroborated by stranding data (TEWG 2009).

The Southeast Fisheries Science Center (SEFSC) has developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009d). This model does not incorporate existing trends in the data (such as nesting trends) but instead relies on available information on the relevant life-history parameters for sea turtles to predict future population trajectories based upon model runs using those parameters. Therefore, the model results do not build upon, but instead are complementary to, the trend data obtained through nest counts and other observations. The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Model runs were done for each individual recovery unit as well as the western North Atlantic population as a whole, and the resulting trajectories were found to be very similar. One of the most robust results from the model was an estimate of the adult female population size for the western North Atlantic in the 2004-2008 time frame. The distribution resulting from the model runs suggest the adult female population size is likely between approximately 20,000 and 40,000 individuals, with a low likelihood of being up to 70,000 (NMFS-SEFSC 2009b). A much less robust estimate for total benthic females in the western North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million (NMFS-SEFSC 2009b).

Threats

Loggerhead sea turtles face numerous natural and anthropogenic threats that help shape its status and affect the ability of the species to recover. The Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009). Domestic fishery operations often capture, injure, and kill sea turtles at various life stages. Loggerheads in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Although loggerhead sea turtles are most vulnerable to pelagic longlines during their immature life history stage, there is some evidence that benthic juveniles may also be captured, injured, or killed by pelagic fisheries (Lewison et al. 2004). Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern U.S., and continue to interact with and kill large numbers of turtles each year. Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters including trawl, gillnet, purse seine, hook-and-line, including bottom longline and vertical line (e.g., bandit gear, handline, and rod-reel), pound net, and trap fisheries (refer to the *Environmental Baseline* section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). In addition to domestic fisheries, sea turtles are subject to incidental capture in numerous foreign fisheries, further exacerbating the ability of sea turtles to survive and recover on a global scale. For example, pelagic, immature loggerhead sea turtles circumnavigating the Atlantic are exposed to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom set lines in the coastal waters of Madeira, Portugal, are reported to take an estimated 500 pelagic immature loggerheads each year (Dellinger and Encarnaçâo 2000) and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets, making it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

There are also many non-fishery impacts affecting the status of sea turtle species, both in the marine and terrestrial environment. In nearshore waters of the U.S., the construction and maintenance of Federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997, NMFS GRBO 2003, Army Corps hopper dredge reporting - http://el.erdc.usace.army.mil/seaturtles/index.cfm). Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants.

Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, and scientific research activities.

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may directly, through loss of beach habitat, or indirectly, through changing thermal profiles and increasing erosion, serve to decrease the amount of nesting area available to females and may change the natural behaviors of both adults and hatchlings (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which has been known to alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991).

Predation by various land predators is a threat to developing nests and emerging hatchlings. Additionally, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008).

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g. DDT and PCBs), and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Loggerheads may be particularly affected by organochlorine contaminants as they were observed to have the highest organochlorine contaminant concentrations of any sea turtle species as measured in sampled tissues from the Mediterranean Sea (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law et al. 1991). Recent efforts have led to improvements in regional water quality in the Gulf of Mexico, although the more persistent chemicals are still detected and are expected to endure for years (Grant and Ross 2002; Mearns 2001). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area. All of the DWH-related impacts mentioned for green sea turtles (e.g., direct oiling, inhalation of volatile compounds, etc.) are likely to have also affected loggerhead sea turtles. As with green turtles, the full impacts of the incident on loggerhead turtles is still being assessed, but a few impacts have been documented. For example, during the response phase to the DWH oil spill (April 26 – October 20, 2010) a total of 88 (21 alive and 67 dead) loggerhead sea turtles were recovered as strandings (dead or debilitated generally onshore or nearshore).

Actions have been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes from various fisheries and other marine activities. Recent actions have taken significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all loggerhead subpopulations. For example, the Turtle Excluder Device (TED) regulation published on February 21, 2003 (68 FR 8456), represents a significant improvement in the baseline effects of trawl fisheries on loggerhead sea turtles, though shrimp trawling is still considered to be one of the largest source of anthropogenic mortality on loggerheads (NMFS-SEFSC 2009d).

Climate change impacts discussed for green sea turtles would also apply to loggerhead turtles. More work has been done on analyzing the potential effects on loggerhead sea turtles. Modeling suggests an increase of 2°C in air temperature compared to long-term mean air temperature through 2005 would result in a sex ratio of over 80 percent female offspring for loggerheads nesting near Southport, North Carolina; increases up to 7.5°C above mean would lead to 100 percent female sex ratio bias. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100 percent female offspring. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most clutches in Cape Canaveral, leading to death (Hawkes et al. 2007). Warmer sea surface temperatures have been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006). Changes in the operational sex ratio (the ratio of fertilizable females to sexually active males at any given time) at locations may be influenced by males migrating from more northerly locations within a species' range and actively reproducing with females from more southerly temperature-affected areas as the sex ratio becomes more female-biased (Witt et al 2010).

3.2.3 Status of Johnson's Seagrass

NMFS believes Johnson's seagrass *(Halophila johnsonii)* is likely to be adversely affected by the proposed action. Johnson's seagrass is the first marine plant ever listed under the ESA. Its listing as threatened under the ESA on September 14, 1998, was based on the results of fieldwork and a status review initiated in 1990. Kenworthy (1993, 1997, 1999) and NMFS (2007) discuss the results of the field studies and summarize an extensive literature review regarding the status of Johnson's seagrass. The following discussion summarizes those findings relevant to our evaluation of the proposed action.

Johnson's seagrass

Life History and Population Biology
Based on the current knowledge of the species, Johnson's seagrass reproduction is believed to be entirely asexual, and dispersal is by vegetative fragmentation. Sexual reproduction in Johnson's seagrass has not been documented. Female flowers have been found; however, dedicated surveys have not discovered male flowers, fertilized ovaries, fruits, or seeds either in the field or under laboratory conditions (Jewett-Smith et al. 1997; Hammerstrom and Kenworthy 2002, NMFS 2007). Searches throughout the range of Johnson's seagrass have produced the same results, suggesting either that the species does not reproduce sexually or that the male flowers are difficult to observe or describe, as noted for other Halophila species (Kenworthy 1997). Surveys to date indicate that the incidence of female flowers appears to be much higher near the inlets leading to the Atlantic Ocean.

Throughout its range, Johnson's seagrass occurs in dynamic and disjunct patches. It spreads rapidly, growing horizontally from dense apical meristems with leaf pairs having short life spans (Kenworthy 1997). Kenworthy suggested that the observed horizontal spreading, rapid growth patterns, and high biomass turnover could explain the dynamic patches observed in distribution studies of this species. While patches may colonize quickly, they may also disappear rapidly. Sometimes they will disappear for several years and then reestablish: a process referred to as "pulsating patches" (Heidelbaugh et al. 2000; Virnstein and Morris 2007; Virnstein et al. 2009). Mortality, or the disappearance of patches, can be caused by a number of processes, including burial from bioturbation and sediment deposition, erosion, herbivory, desiccation, and turbidity. In the absence of sexual reproduction, one possible explanation for the pulsating patches is dispersal and reestablishment of vegetative fragments, a process that commonly occurs in aquatic plants and has been demonstrated in other seagrasses (Philbrick and Les 1996, DiCarlo et al. 2005), and was also recently confirmed by experimental mesocosm studies with Johnson's seagrass (Hall et al. 2006).

Johnson's seagrass is a shallow-rooted species and vulnerable to uprooting by wind, waves, storm events, tidal currents, bioturbation, and motor vessels. It is also vulnerable to burial by sand movement and siltation (Heidelbaugh et al. 2000). Having a canopy of only 2-5 cm, it may be easily covered by sediments transported during storms or redistributed by macrofaunal bioturbation during the feeding activities of benthic organisms. Mesocosm experiments indicate that clonal fragments can only survive burial for up to a period of twelve days (W.J. Kenworthy, CCFHR, NOAA, Beaufort, NC, unpublished). Mechanisms capable of disturbing patches may create clonal fragments that become dispersed. Hall et al. (2006) showed that drifting fragments of Johnson's seagrass can remain viable for four to eight days, during which time they can settle, root, and grow. Fragments could drift several kilometers under the influence of wind and tidally-driven circulation, providing potential recruits for dispersal and new patch formation. In the absence of sexual reproduction, these are likely to be the most common forms of dispersal and patch maintenance.

Status and Distribution

Johnson's seagrass occurs in a variety of habitat types, including on intertidal wave-washed sandy shoals, on flood deltas near inlets, in deep water, in soft mud, and near the mouths of canals and rivers, where presumably water quality is sometimes poor and where salinity fluctuates widely. It is an opportunistic plant that occurs in a patchy, disjunct distribution from the intertidal zone to depths of approximately 2-3 meters in a wide range of sediment types, salinities, and in variable water quality conditions (NMFS 2007).

Johnson's seagrass exhibits a narrow range of distribution and has only been found growing along approximately 200 kilometers (km) of coastline in southeastern Florida north of Sebastian Inlet, Indian River County, south to Virginia Key in northern Biscayne Bay, Miami-Dade County. This apparent endemism suggests that Johnson's seagrass has the most limited geographic distribution of any seagrass in the world. Kenworthy (1997, 1999) confirmed its limited geographic distribution in patchy and vertically disjunct areas throughout its range. Since the last status review (NMFS 2007), there have not been any reported reductions in the geographic range of the species. In fact, the St. Johns River Water Management District (SJRWMD) observed Johnson's seagrass approximately 21 km north of the Sebastian Inlet mouth on the western shore of the Indian River Lagoon – a discovery that slightly extends the species' known northern range (Virnstein and Hall 2009).

Two survey programs regularly monitor the presence and abundance of Johnson's seagrass within this range. One program, conducted by the SJRWMD since 1994, covers the northern section of the species' geographic range between Sebastian Inlet and Jupiter Inlet (Virnstein and Morris 2007, Virnstein et al. 2009). The second recently initiated survey (2006) is of the southern range of the species between Jupiter Inlet and Virginia Key in Biscayne Bay (Kunzelman 2007). Johnson's seagrass has been found to be a perennial species showing no consistent seasonal or year-to-year pattern in these surveys, but has exhibited some winter decline. However, during exceptionally mild winters, Johnson's seagrass can maintain or even increase in abundance from summer to winter. In the surveys conducted between 1994 and 2007, it occurred in 7.1 percent of the 1-square meter quadrats in the northern range. Depth of occurrence within these surveys ranged from 0.03 to 2.5 m.

Based on the results of the southern transect sampling, it appears there is a relatively continuous, although patchy, distribution of the species from Jupiter Inlet to Virginia Key, at least during periods of relatively good environmental conditions and no significant large-scale disturbances (NMFS 2007). The largest reported contiguous meadow of Johnson's seagrass in the southern range was observed in Lake Worth Lagoon and was estimated to be 30 acres (Kenworthy 1997). Eiseman and McMillan (1980) documented Johnson's seagrass in the vicinity of Virginia Key (Latitude 25.75º N'); this location is considered to be the southern limit of the species' range. There have been no reports of this species further south of the currently known southern distribution. The presence of Johnson's seagrass in northern Biscayne Bay (north of Virginia Key) is well documented. In addition to localized surveys, the presence of Johnson's seagrass has been documented by various field experiences and observations of the area by federal, state, and county entities. Johnson's seagrass has been documented in various USACE and U.S. Coast Guard (USCG) permit applications reviewed by NMFS.

Information on the species' distribution and results of limited experimental work suggest that Johnson's seagrass has a wider tolerance range for salinity, temperature, and optical water quality conditions than other species such as paddle grass (*Halophila decipiens*) (Dawes et al. 1989, Kenworthy and Haunert 1991, Gallegos and Kenworthy 1996, Kenworthy and Fonseca 1996, Durako et al. 2003, Kunzelman et al. 2005, Torquemada et al. 2005). Johnson's seagrass has been observed growing perennially near the mouths of freshwater discharge canals (Gallegos and Kenworthy 1996), in deeper turbid waters of the interior portion of the Indian River Lagoon (Kenworthy 2000, Virnstein and Morris 2007), and in clear water associated with the high energy environments and flood deltas inside ocean inlets (Kenworthy 1993, 1997, Virnstein et al. 1997, Heidelbaugh et al. 2000, Virnstein and Morris 2007). It can colonize and persist in high tidal-energy environments and has been observed where tidal velocities approach the threshold of motion for unconsolidated sediments (35-40 cm s-1). The persistent presence of high-density, elevated patches of Johnson's seagrass on flood tidal deltas near inlets suggests that it is capable of sediment stabilization. Intertidal populations of Johnson's seagrass may be completely exposed at low tides, suggesting high tolerance to desiccation and wide temperature tolerance.

In Virnstein's study areas within the Indian River Lagoon, Johnson's seagrass was found associated with other seagrass species or growing alone in the intertidal, and, more commonly, at the deep edge of some transects. In areas in which long-term, poor water and sediment quality have existed until recently, Johnson's seagrass appears to occur in relatively higher abundance perhaps due to the inability of the larger species to thrive. Johnson's seagrass appears to be out-competed in seagrass habitats where environmental conditions permit the larger seagrass species to thrive (Virnstein et al. 1997; Kenworthy 1997). However, where the larger, canopy-forming species are absent, Johnson's seagrass can grow throughout the full seagrass depth range (NMFS 2007).

Observations by researchers have suggested that Johnson's seagrass exploits unstable environments or newly-created, unvegetated patches by exhibiting fast-growth and support for all local ramets in order to exploit areas in which it could not otherwise compete. It may quickly recruit to locally uninhabited patches and through prolific lateral branching and fast horizontal growth, but may decline once conditions become unfavorable. While these attributes may allow it to compete effectively in periodically disturbed areas, if the distribution of this species becomes limited to stable areas it may eventually be out-competed by more stable-selected plants represented by the larger-bodied seagrasses (Durako et al. 2003). In addition, the physiological attributes of Johnson's seagrass may limit growth (i.e., spreading) over large areas of substrate if the substrate is somehow altered (e.g., dredging to a depth that would preclude future recruitment of Johnson's seagrass); therefore, its ability to recover from widespread habitat loss may be limited. The clonal and reproductive growth characteristics of Johnson's seagrass result in its distribution being patchy, non-contiguous, and temporally fluctuating. These attributes suggest that colonization between broadly disjunct areas is likely difficult and that the species is vulnerable to becoming endangered if it is removed from large areas within its range by natural or anthropogenic means.

Threats

The most clearly identified threat to date is the possibility of mortality due to reduced salinity over long periods of time. Some studies have shown that Johnson's seagrass has a wide tolerance for salinity. However, short-term experiments have shown reduced photosynthesis and increased mortality at low salinities (< 10 psu). Longer duration mesocosm experiments have resulted in 100 percent mortality of Johnson's seagrass after 10 days at salinities less than 10 psu (Kahn and Durako 2008). The Johnson's Seagrass Recovery Implementation Team has determined that the most significant threat to the species is the present or threatened destruction, modification or curtailment of its habitat or range through water management practices and stochastic environmental factors that can alter the salinity of Johnson's seagrass habitat. Given that it is not uncommon for salinities to decline below 15-20 psu in its range (Steward et al. 2006), and that a number of natural and human-related factors can affect salinity throughout its range, the Team identified reduced salinity as a potential significant threat to the species. In the critical habitat designation rule and in the Recovery Plan, several additional threats were also considered, including: (1) dredging and filling, (2) construction and shading from in- and over-water structures, (3) propeller scarring and anchor mooring, (4) trampling, (5) storms, and (6) siltation. Since the listing, the Team has conducted assessments of each of these factors and has been unable to confirm that any of these pose a significant threat to the existence of the species. A brief summary discussion of these factors follows.

Dredging and filling activities and the construction of in- and over-water structures are closely scrutinized through federal, state, and local permitting programs. The USACE, under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, has federal authority over the issuance of dredge and fill permits. This permitting process includes language to protect and conserve seagrasses through field evaluations, consultations, and recommendations to avoid, minimize and mitigate for impacts to seagrasses. The USACE's State (Florida) Programmatic General Permit Program (SPGP) authorizes permits for the construction of docks, boat ramps, piers, maintenance dredging, and the construction of other minor over-water structures. The SPGP has had an increase in the number of permits authorized between 2000 and 2006 (based on data provided by the USACE), except for periods when the USFWS was involved in litigation over the manatee (*Trichechus manatus latirostris*). Additional levels of consultation by NMFS staff may directly address permits involving Johnson's seagrass, depending on the location and size of the project and if the project is proposed in critical habitat. The Team has worked with NMFS' Protected Resources and Habitat Conservation staff to develop and improve guidelines for site monitoring methods (Greening and Holland 2003), dock construction guidelines (NMFS and USACE 2002, Shafer et al. 2008), and best management practices to minimize the impact of docks on Johnson's seagrass (Landry et al. 2008).

Dock height, width, and orientation have been identified as the three most important factors affecting seagrass growth (Burdick and Short 1999). In their report on the effects of docks on seagrasses, Landry et al. (2008) stated there is a compelling argument supporting prior studies that indicate that docks can have negative impacts on seagrasses by reducing their abundance and in some cases, preventing seagrass from growing. However, they found that although it is reduced in frequency under docks with grated decking, Johnson's seagrass was observed in higher densities under the grated docks compared to non-grated docks. Furthermore, their results suggest that Johnson's seagrass does benefit from the light-transmitting characteristics of grated decking. Landry et al. (2008) found that transects under grated docks were not significantly different from the adjacent and the reference transects for Johnson's seagrass. This suggests that while both grated and non-grated docks may affect seagrass beds, grated decking does not appear to cause significant harm to Johnson's seagrass and it is less detrimental to other seagrass species (W.J. Kenworthy, (retired) National Ocean Service, pers. comm. to K. Davy, NMFS, 2013). Given the supporting experimental evidence that fiberglass grating does improve the incident solar radiation penetrating under structures (Shafer and Robinson 2001), continuing to require grated decking will benefit most seagrasses. Landry et al. (2008) recommend that grated decking should be used for any dock construction to take place over seagrasses, most importantly Johnson's seagrass.

In the results from their study evaluating the regulatory construction guidelines to minimize impacts to seagrasses from single-family residential dock structures in Florida and Puerto Rico, Shafer et al. (2008) emphasized avoidance of seagrasses as a first priority. Avoidance may be achieved by relocating or realigning the structure. It is important to note that Shafer et al. (2008) observed that in the majority of cases, permit applicants and regulatory agencies are, when practical, generally succeeding in avoiding seagrass impacts by extending the length of the access walkway so that the terminal platform is constructed in deep water that is not conducive to seagrass growth. If avoidance is not possible, Shafer et al. (2008) recommend revising the USACE-NMFS dock construction guidelines to prioritize dock orientation (in a north-south direction) and height (minimum of five feet above mean high water) as the most important specifications for the survivorship of seagrasses under docks.

While most dock construction is subject to the construction guidelines (i.e., the USACE and NMFS jointly developed October 2002, *Key for Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's Seagrass* and the associated August 2001, *Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation, Marsh, or Mangrove Habitat*), some docks meeting certain provisions, are exempt from state permitting (http://www.dep.state.fl.us/central/Home/SLERP/Docks/sfdock.pdf) and contribute to the loss of Johnson's seagrass through construction impacts and shading.

The USACE's SPGP authorizes permits for the construction of docks, boat ramps, piers, maintenance dredging, and the construction of other minor over-water structures. NMFS completed programmatic ESA Section 7 consultation with the USACE in December 2011 on the current 5-year SPGP. The opinion includes conservation recommendations for Johnson's seagrass. In addition to shading from docks, fixed add-ons to exempt docks (such as finger piers, floating docks, or boat lifts) have been documented as an additional source of seagrass loss due to shading (Smith and Mezich 1999).

Routine maintenance dredging associated with the constant movement of sediments in and around inlets may affect seagrasses by direct removal, light limitation due to turbidity, and burial from sedimentation. The disturbance of sediments can also destabilize the benthic community. Altering benthic topography or burying the plants may remove them from the photic zone. Permitted dredging of channels, basins, and other in- and on-water construction projects cause loss of Johnson's seagrass and its habitat through direct removal of the plants, fragmentation of habitat, shading, turbidity, and sedimentation.

During their review, the Team identified weaknesses in the oversight practices of state and federal agencies in the permitting process due to budget, staffing, and technological limitations. The Team also identified difficulties in monitoring a rare and patchily-distributed species in single-event surveys associated with permit applications and continues to work with collaborators to improve monitoring methods. While it is recognized that the activities described above may adversely affect Johnson's seagrass and its habitat, the Team determined that these activities were local and small-scale and the deficiencies in the permitting process were not presently a significant threat to the survival of Johnson's seagrass because they will not individually or cumulatively result in long-term, large-scale mortality of Johnson's seagrass, and preclude the species from its strategy of recolonizing areas.

Propeller scarring and improper anchoring are known to adversely affect seagrasses (Sargent et al. 1995; Kenworthy et al. 2002). These activities can severely disrupt the benthic habitat by uprooting plants, severing rhizomes, destabilizing sediments, and significantly reducing the viability of the seagrass community. Propeller dredging and improper anchoring in shallow areas are a major disturbance to even the most robust seagrasses. This destruction is expected to worsen with the predicted increase in boating activity within Florida. The most complete records available indicate that in 2012, there were 891,981 registered vessels[7] in Florida (www.flhsmv.gov/dmv/TaxCollDocs/vesselstats2012). This number is likely to increase based on Florida's projected population growth of up to 25 million in 2025 (www.propertytaxreform.state.fl/docs/eo06141.pdf). An increase in the number of registered vessels will likely lead to an increase in adverse effects to seagrasses caused by propeller dredging/scarring. Other indirect effects associated with motor vessels include turbidity from operating in shallow water, dock construction and maintenance, marina expansion, and inlet maintenance dredging. These activities are also likely to increase (NMFS 2007). Damage to seagrasses from propeller scarring and improper anchoring by motor vessels is recognized as a significant resource management problem in Florida (Sargent et al. 1995). A wide range of local, state, and federal statutes protect seagrasses from damage due to vessel impacts and a number of conservation measures, including the designation of vessel control zones, signage and public awareness campaigns, are directed at minimizing vessel damage to seagrasses. Despite

[7] Excluding canoes. Florida vessel registration requirements apply to all powered vessels regardless of size and all non-powered vessels greater than 16 feet in length.

these efforts, vessel damage can have significant local and small-scale (one square meter to 100 square meters) impacts on seagrasses (Kirsch et al. 2005), but there is no direct evidence that these small-scale local effects are so widespread that they are a threat to the survival of Johnson's seagrass.

Trampling of seagrass beds, a secondary effect of recreational boating, also disturbs seagrass habitat, but is a lesser concern. Trampling damages seagrasses by pushing leaves into the sediment and crushing or breaking the leaves and rhizomes. Since the designation of critical habitat, however, there have been no documented observations or reports of damage by trampling and if there was, it would be small-scale and local. Therefore, the Team determined that trampling does not constitute a significant threat to the survival of the Johnson's seagrass.

Large-scale weather events, such as tropical storms and hurricanes, while they often generate runoff conditions that decrease water quality; they also produce conditions (wind setup and abrupt water elevation changes) that can increase flushing rates. The effects of storms can be complex. Specifically documented storm effects on seagrasses include (1) scouring and erosion of sediments, (2) erosion of seeds and plants by waves, currents, and surge, (3) burial by shifting sand, (4) turbidity, and (5) discharge of freshwater, including inorganic and organic constituents in the effluents (Steward et al. 2006). Storm effects may be chronic, e.g., due to seasonal weather cycles, or acute, such as the effects of strong thunderstorms or tropical cyclones. Studies have demonstrated that healthy, intact seagrass meadows are generally resistant to physical degradation from severe storms, whereas damaged seagrass beds may not be as resilient (Fonseca et al. 2000, Whitfield et al. 2002). In the late summer and early fall of 2004, four hurricanes passed directly over the northern range of Johnson's seagrass in the Indian River Lagoon. A post-hurricane random survey in the area of the Indian River Lagoon affected by the four hurricanes indicated the presence of Johnson's seagrass was similar to that reported by the SJRWMD transect surveys prior to the storms. This indicates that while the species may decline initially, under the right conditions it can return quickly (Virnstein and Morris 2007). Despite evidence of longer-term reductions in salinity, increased water turbidity, and increased water color associated with higher than average precipitation in the spring of 2005, there was no evidence of long-term chronic impacts to seagrasses and no direct evidence of damage to Johnson's seagrass that could be considered a threat to the survival of the species (Steward et al. 2006).

Silt derived from adjacent land and shoreline erosion, river and canal discharges, inlets, and internally resuspended materials can lead to the accumulation of material on plant leaves causing light deprivation. Deposition of silt can also lead to the burial of plants, accumulation of organic matter, and anoxic sediments. Johnson's seagrass grows in a wide range of environments, including those that are exposed to siltation from all the potential sources. Documentation of the direct effects of siltation on seagrasses are generally unavailable. The absence of seagrass has been associated with the formation of muck deposits, however, and localized areas of flocculent, anoxic sediments in isolated basins and segments of the Indian River Lagoon have been observed. Furthermore, sustained siltation experimentally simulated by complete burial for at least 12 days may cause mortality of Johnson's seagrass (W.J. Kenworthy, National Ocean Service, Beaufort, North Carolina, unpublished data). In general, the effects of siltation are localized and not widespread and are not likely to threaten the survival of the species.

Availability of light is one of the most significant environmental factors affecting the survival, growth, and distribution of seagrasses (Bulthuis 1983; Dennison 1987; Abal et al. 1994; Kenworthy and Fonseca 1996). Water quality and the penetration of light are affected by turbidity (suspended solids), color, nutrients, and chlorophyll and are major factors controlling the distribution and abundance of seagrasses (Dennison et al. 1993, Kenworthy and Haunert 1991, Kenworthy and Fonseca 1996). Increases in color and turbidity values throughout the range of Johnson's seagrass are generally caused by high flows of freshwater discharged from water management canals, which can also reduce salinity. Wastewater and stormwater discharges, as well as from land runoff and subterranean sources, are also causes of increased turbidity. Degradation of water quality due to increased land use and poor water management practices continues to threaten the welfare of seagrass communities. Declines in water quality are likely to worsen, unless water management and land use practices can curb or eliminate freshwater discharges and minimize inputs of sediments and nutrients. A nutrient-rich environment caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural runoff stimulates increased algal growth that may smother or shade Johnson's seagrass, or shade rooted vegetation, and diminish the oxygen content of the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities.

Based on a Trophic State Index of ambient water quality obtained in the northern and central region of Johnson's seagrass geographic range provided in a long-term monitoring program implemented by the SJRWMD, overall estuarine water quality was assessed as mostly good (67 percent) (Winkler and Ceric, 2006). Only 28 percent of the stations sampled had fair water quality, while six percent had poor quality. Fifty percent of the sampled estuarine sites were improving, while six percent were degrading, so many more sites were improving than were degrading. Forty-two percent of the lagoon sites had an insignificant trend while three percent had insufficient data to determine a trend. As water management experts have now become confident in the correspondence between water quality and seagrass depth distribution, they have begun establishing water quality targets for the Indian River Lagoon based on seagrass as an indicator (Steward et al. 2005). There is a strong positive correlation between seagrass depth distribution and water quality that enables managers to predict where seagrasses will grow based on water quality and the availability of light. Given that at least half of the stations were indicating long-term improvements in water quality, it can be assumed that seagrass abundance should not be negatively impacted if water and land use management programs continue to be effective. For example, carefully controlling or reducing water flows from discharge canals will moderate salinity fluctuations and reduce turbidity, color, and light attenuation values. However, there may be localized degradation near urbanized sites with multiple water quality problems that are more difficult to manage, such as the vicinity of the Saint Lucie Inlet where the discharges from Lake Okeechobee have had significant impacts on water quality and seagrasses.

There has not been a comprehensive assessment of water quality published or reported for the southern range of Johnson's seagrass similar to the SJRWMD study. However, water quality experts at the South Florida Water Management District (SFWMD) report that efforts are underway to synthesize water quality information and to gain a more comprehensive understanding of the long-term status and trends of water quality in the southern range of Johnson's seagrass. Of particular concern is an assessment of the impacts of fluctuations in water quality corresponding with variation in climatology, especially "wet years" versus "dry years" variation. Future recovery efforts should include close coordination with the SFWMD and county environmental management agencies in Palm Beach and Dade counties to evaluate the status and trends of water quality in these regions of the species' distribution.

In addition to the six factors discussed above, we also consider the possible effects of climate change on Johnson's seagrass. Specifically, we consider the possible effects of rising temperatures and sea levels on Johnson's seagrass. While sea level has changed many times during the evolutionary history of this species and Johnson's seagrass seems to handle temperature changes fairly well (W.J. Kenworthy, National Ocean Service, pers. comm. to A. Livergood, NMFS, 2010), it is uncertain how this species will fare when considering the combined effects of rising temperatures and sea levels. Here, we consider some potential effects of rising temperatures and sea levels on seagrasses in general, including some discussion on potential effects on Johnson's seagrass in particular.

The earth is projected to warm between 2°-4°C by 2100, and similar projections have been made for marine systems (Sheppard and Rioja-Nieto 2005). At the margins of temperate and tropical bioregions and within tidally-restricted areas where seagrasses are growing at their physiological limits, increased temperatures may result in losses of seagrasses and/or shifts in species composition (Short et al. 2007). The response of seagrasses to increased water temperatures will depend on the thermal tolerance of the different species and their optimum temperature for photosynthesis, respiration, and growth (Short and Neckles 1998).

With future climate change and potentially warmer temperatures, there may be a 1-5 m rise in the seawater levels by 2100 when taking into account the thermal expansion of ocean water and melting of ocean glaciers. Rising sea levels may adversely impact seagrass communities due to increases in water depths above present meadows reducing available light. Changing currents may cause erosion and increased turbidity and seawater intrusions higher up on land or into estuaries and rivers, which could increase landward seagrass colonization (Short and Neckles 1998). A landward migration of seagrasses with rising sea levels is a potential benefit, so long as suitable substrate is available for colonization. Climate change may also reduce light by shifting weather patterns to cause increased cloudiness. It has been shown that evolutionary change in a species can occur within a few generations (Rice and Emery 2003), thus making it possible for seagrasses to cope if the changes occur at a rate slow enough to allow for adaptation. Consider that sea levels have changed many times in the evolutionary history of Johnson's seagrass (W.J. Kenworthy, National Ocean Service, pers. comm. to A. Livergood, NMFS 2010); thus, it is possible that rising sea levels could potentially benefit Johnson's seagrass and other seagrass species (i.e., via landward migration) so long as suitable substrate is available for colonization.

It is uncertain how Johnson's seagrass will adapt to rising sea levels and temperatures. Much depends on how much temperatures increase and how quickly. For example, Johnson's seagrass that grows intertidally (e.g., in some parts of the Lake Worth Lagoon) may be affected by a slight change in temperature (since it may already be surviving under less than optimal conditions); however, this may be ameliorated with rising sea levels, assuming Johnson's seagrass would migrate landward with rising sea levels and assuming that suitable substrate would be available for a landward migration.

In summary, rising sea levels may potentially benefit Johnson's seagrass and other seagrass species, assuming they are able to migrate landward and assuming suitable substrate is available. However, rising sea levels could also adversely impact seagrass communities due to increases in water depths above present meadows reducing available light. Reduction in light availability may benefit some seagrass species (e.g., *Halophila* species that require less light compared to the larger, canopy-forming species); therefore, much depends on the thermal tolerance of the different seagrass species and their optimum temperature for photosynthesis, respiration, and growth (Short and Neckles 1998). It is uncertain how Johnson's seagrass and other seagrass species will be affected by the synergistic effects of rising temperatures and sea levels (in combination with other stressors, such as reduced salinity from freshwater runoff). It has been shown that evolutionary change in a species can occur within a few generations (Rice and Emery 2003), thus making it possible for seagrasses to cope if the changes occur at a rate slow enough to allow for adaptation.

Status Summary

Based on the results of 14 years of monitoring in the species' northern range (1994-2007) and three years of monitoring in the species' southern range (2006-2009), there has been no significant change in the northern or southern range limits of Johnson's seagrass (NMFS 2007). It appears that the populations in the northern range are stable and capable of sustaining themselves despite stochastic events related to severe storms (Steward et al. 2006) and fluctuating climatology. Longer-term monitoring data is needed to confirm the stability of the southern distribution of the species (NMFS 2007). However, based on the results of the southern transect sampling, it appears there is a relatively continuous, although patchy, distribution of Johnson's seagrass from Jupiter Inlet to Virginia Key, at least during periods of relatively good environmental conditions and no significant large-scale disturbances. Larger seagrasses, predominantly turtle grass (*Thalassia testudinum*), begin to out-compete Johnson's seagrass in this area. While there has been a slight extension in the known northern range (Virnstein and Hall 2009), the limits of the southern range appear to be stable (Latitude 25.75ºN in the vicinity of Virginia Key). There have been no reports of this species further south of the currently known southern distribution.

As discussed in the Threats section, the Recovery Team has determined that the most clearly identified threat to the survival of the species is the possibility of mortality due to reduced salinity over long periods of time. The other potential threats discussed above (i.e., dredging/filling, construction and shading from in and over-water structures, propeller scarring and anchor mooring, trampling, storms, and siltation) were determined to be generally local and small-scale and are not considered threats to the survival and recovery of the species. It is uncertain how Johnson's seagrass and other seagrass species will fare due to the synergistic effects of rising temperatures and sea levels (in combination with other stressors, such as reduced salinity from freshwater runoff). It has been shown that evolutionary change in a species can occur within a few generations (Rice and Emery 2003), thus making it possible for seagrasses to cope if the changes occur at a rate slow enough to allow for adaptation.

4 ENVIRONMENTAL BASELINE

This section is a description of the past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline is a “snapshot” of the action area at a specified point in time and includes state, tribal, local, and private actions already affecting the species that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting the same species that have completed formal or informal consultation area also part of the environmental baseline, as are federal and other actions within the action area that may benefit the listed species. The purpose of describing the environmental baseline in this manner is to provide context for the effects of the proposed action on the listed species: in sum, we evaluate the relevant baseline to determine whether there are effects on the listed species in the baseline, that may act synergistically with the effects of the proposed action. For example, some individuals of listed species may be exposed to stressors of other activities in the baseline (e.g., turtles may be captured though released in certain fisheries), and some of the effects in the baseline may have effects on listed species above the individual level. This opinion describes these activities’ effects in the sections below.

4.1 Status of Sea Turtles in the Action Area

The green and loggerhead sea turtles that occur in the action area are highly migratory, as are all sea turtles species worldwide. The status of these species in the Atlantic (see Section 3) most accurately reflects the species’ status within the action area.

Juvenile green sea turtles can be found foraging in the Lake Worth Lagoon on seagrasses. Habitats near to or within the action area provide known foraging habitat for green sea turtles (Britton and Morton 1989, Metz 2004). Loggerhead turtles may be found foraging on crabs during the seasonal spawning period for crabs (Guillory and Elliot 2001, Metz 2004).

In Section 3 we presented available information on sea turtle population abundance and trends by species. Green sea turtle populations have experienced significant increases since the late 1990s. Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9 percent annually. Some other nesting assemblages (e.g., Florida) exhibited even higher annual growth.

4.1.1 Federal Actions Affecting Sea Turtles in the Action Area

The action area consists of the Palm Beach Harbor entrance channel and federal navigational channel, the ODMDS, the nearshore disposal area, and routes of vessel travel to and from the disposal areas. Hopper dredging may occur in portions of the project area and is the only project activity likely to directly affect green and loggerhead sea turtles. Sea turtle interactions with hopper dredges within the action area have resulted in 11 takes of sea turtles (three greens and eight loggerheads) since 1994.

NMFS has completed a number of Section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse impacts of the action on sea turtles. NMFS has undertaken recovery actions under the ESA to address sea turtle takes in the fishing and shipping industries and other activities such as USACE dredging operations. The summary below of federal actions and the effects these actions have had or are having on sea turtles includes only those federal actions in, or with effects within, the action area that have already concluded or are currently undergoing formal Section 7 consultation.

Federal Vessel Activity and Operations
Potential sources of adverse effects from federal vessel operations in the action area include operations of the USN and USCG, the EPA, NOAA, and the USACE. Individual sea turtles may have been removed from the action area through lethal impacts from federal vessel actions in the past. NMFS has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. Completed formal consultations on overall USN activities in the southeastern United States have included: USN Atlantic Fleet Sonar Training Activities (AFAST) (January 20, 2011), USN AFAST LOA 2012-2014, and USN active sonar training along the Atlantic Coast and Gulf of Mexico (December 19, 2011). These opinions concluded that although there is a potential for some USN activities to effect sea turtles, those effects were not expected to impact any species on a population level. Therefore, the activities were determined to be not likely to jeopardize the continued existence of any ESA-listed sea turtle species.

Dredging
The construction and maintenance of federal navigation channels and sand mining sites ("borrow areas") has been identified as a source of sea turtle mortality. Hopper dredges in the dredging mode are capable of moving relatively quickly, compared to sea turtle swimming speeds and can thus overtake, entrain, and kill sea turtles as the suction draghead of the advancing dredge overtakes the resting or swimming turtle. Entrained sea turtles rarely survive. NMFS completed a regional biological opinion on the impacts of USACE's South Atlantic coast hopper-dredging operations in 1997 for dredging in the USACE's South Atlantic Division (NMFS 1997b). The opinion did determine hopper dredging in the South Atlantic Division would adversely affect four sea turtle species, including those that may be adversely affected by the proposed action (i.e., green and loggerheads), but would not jeopardize their continued existence. An annual ITS of seven Kemp's ridleys, seven green turtles, two hawksbills, and sixteen loggerhead turtles was included in the 1997 SARBO. Reinitiation of the SARBO has been required due to a variety of factors, including new species listings and critical habitat designations.

ESA Permits
The ESA allows issuance of permits for take of certain ESA-listed species for the purposes of scientific research under Section 10(a)(1)(a) of the ESA. Prior to issuance of these permits, the proposal must be reviewed for compliance with Section 7 of the ESA.

Sea turtles are the focus of research activities authorized by Section 10 permits under the ESA. As of January 2012, there were 26 active scientific research permits directed toward sea turtles that are applicable to the action area of this biological opinion. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured sea turtles. The number of authorized takes varies widely depending on the research and species involved but may involve the taking of hundreds of sea turtles annually. Most takes authorized under these permits are expected to be nonlethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, issuance of the permit by NMFS must also undergo an ESA Section 7 analysis to ensure the permitted activity is not likely to jeopardize the continued existence of affected species.

Finfish Fisheries

Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area of the proposed action. Efforts to reduce the adverse effects of commercial fisheries are addressed through the ESA Section 7 process. Trawl, hook-and-line, gillnet, and cast net gear fisheries have all been documented as interacting with sea turtles. For each of these fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated under Section 7. Several formal consultations have been conducted on the following fisheries that NMFS has determined are likely to adversely affect threatened and endangered species (including sea turtles): the South Atlantic and Gulf of Mexico coastal migratory pelagic fishery, Southeast shrimp fishery, and Atlantic Highly Migratory Species shark fishery. An Incidental Take Statement (ITS) has been issued for interactions with sea turtles in each of these fisheries.

NMFS completed a Section 7 consultation on the continued authorization of the coastal migratory pelagic fishery in the South Atlantic (NMFS 2007c) where hook-and-line, gillnet, and cast net gears are used. The recreational sector uses hook-and- line gear. The hook-and-line effort is primarily trolling. The biological opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery.

In 2008, NMFS issued a biological opinion on the continued authorization of Highly Migratory Species Atlantic shark fisheries (NMFS 2008). This commercial fishery uses bottom longline and gillnet gear. The recreational sector of the fishery uses only hook-and-line gear. To protect declining shark stocks, the proposed action seeks to greatly reduce the fishing effort in the commercial component of the fishery. These reductions are likely to greatly reduce the interactions between the commercial component of the fishery and sea turtles. The biological opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery but that the proposed action was not expected to jeopardize the continued existence of any of these species.

Southeastern Shrimp Trawl Fisheries

The Southeast shrimp fishery affects sea turtles as they rest, forage, or swim on or near the bottom where they are captured by shrimp trawls pulled along the bottom. In 1990, the National Research Council (NRC) concluded the Southeast shrimp trawl fishery affected more sea turtles than all other activities combined and was the most significant anthropogenic source of sea turtle mortality in U.S. waters, in part due to the high reproductive value of turtles interacted with in this fishery (NRC 1990). The level of annual mortality described in NRC (1990) is believed to have continued until 1992-1994, when U.S. law required all shrimp trawlers in the Atlantic to use turtle excluder devices (TEDs), which allowed some turtles to escape nets before drowning (NMFS 2002). TEDs approved for use have had to demonstrate 97 percent effectiveness in excluding sea turtles from trawls in controlled testing. Despite the apparent success of TEDs for some species of sea turtles (e.g., Kemp's ridleys), it was later discovered that TEDs were not adequately protecting all species and size classes of sea turtles. Analyses by Epperly and Teas (2002) indicated that the minimum requirements for the escape opening dimension in TEDs in use at that time were too small for some sea turtles and that many of the loggerheads stranding annually along the Atlantic were too large to fit the existing openings. In February 2003, NMFS implemented revisions to the TED regulations addressing that problem (68 FR 8456, February 21, 2003). The revised TED regulations were expected to reduce shrimp trawl related mortality by 94 percent for loggerheads and 97 percent for leatherbacks.

In addition to improvements in TED designs, interactions between sea turtles and otter trawls in the years leading up to this consultation were also thought to be declining because of reductions of fishing effort unrelated to fisheries management actions. Over the past ten years, low shrimp prices, rising fuel costs, competition with imported products, and the impacts of hurricanes in the Gulf of Mexico have all impacted shrimp fleets; in some cases reducing fishing effort by as much as 50 percent in offshore waters of the Gulf of Mexico (GMFMC 2007). For example, the estimated annual number of interactions and mortalities between sea turtles and shrimp trawls in the Gulf shrimp fisheries (state and federal) under the new regulation (68 FR 8456, February 21, 2003) based on Epperly et al. (2002) estimated catch per unit effort and updated 2007 effort data in Nance et al. (2008) were significantly less than predicted in the 2002 opinion. However, given elevated strandings in the northern Gulf of Mexico during the springs of 2010 and 2011, necropsy information indicating that drowning may have contributed to many of the mortalities, and evidence of TED compliance issues in the fisheries, these estimates likely underrepresented actual past effects from shrimp fisheries in the Gulf of Mexico.

On May 9, 2012, NMFS completed an opinion that analyzed the continued implementation of the sea turtle conservation regulations requiring use of turtle excluder devices during shrimp trawl fishing, and the continued authorization of the Southeast U.S. shrimp fisheries in federal waters under the Magnuson-Stevens Act (NMFS 2012). The opinion also considered a proposed amendment to the sea turtle conservation regulations that would withdraw the alternative tow time restriction at 50 CFR 223.206(d)(2)(ii)(A)(*3*) for skimmer trawls, pusher-head trawls, and wing nets (butterfly trawls) and instead require all of these vessels to use TEDs. The opinion did validate the assumption that levels of turtle take and mortality in the previous biological opinion were underestimated, but concluded that the proposed action would not jeopardize the continued existence of any sea turtle species. An ITS was provided that used trawl effort and capture rates as proxies for sea turtle take levels because there is enormous uncertainty in the range of numbers of turtles taken in this fishery. The biological opinion requires NMFS to minimize the impacts of incidental takes through monitoring of shrimp effort and regulatory compliance levels, conducting TED training and outreach, and continuing to research the effects of shrimp trawling on listed species. Consultation for this fishery has recently been reinitiated due to withdrawal of the proposed rule for skimmer trawls discussed above.

Beach Nourishment
Beach nourishment requires a Clean Water Act permit from the USACE. The activity of beach nourishment, especially when impacts include the loss of nearshore hardbottom habitat along the east coast of Florida, has been documented to result in injury and death of juvenile green sea turtles. Juvenile green turtles are known to utilize these high-energy, dynamic habitats for foraging and as refugia, and show a preference for this habitat even when abundant deeper-water sites are available. The loss of such limited habitat, especially when considering the cumulative loss as a result of beach nourishment activities occurring along the entire range of the habitat and continually over time, is expected to result in loss of foraging opportunities and protective refuge. The stresses are also expected to contribute to mortality of individuals already in poor condition as a result of disease or other factors (NMFS 2008a). NMFS issued a biological opinion to the USACE on March 13, 2008, for proposed beach renourishment of Reach 8 in Palm Beach County, Florida (F/SER/2007/08929). NMFS authorized take of up to 19 green sea turtles associated with the permanent loss of 6.95 acres of nearshore hardbottom, which serves as foraging and resting habitat for juvenile green turtles. While it was NMFS' opinion that the project was likely to adversely affect green sea turtles, NMFS concluded that the proposed action was not likely to jeopardize their continued existence.

NMFS issued a biological opinion on September 4, 2008, for the Brevard County Mid-Reach beach renourishment project (F/SER/2005/06003). The Mid-Reach project is located just north of the South Beach Reach A project and used the same proposed borrow areas (Canaveral Shoals). A hopper dredge was also used for the Mid-Reach project. NMFS authorized nonlethal take of up to 15 green turtles associated with the estimated loss of 2.95 acres of nearshore foraging and resting habitat. While it was NMFS' opinion that the project was likely to adversely affect green sea turtles, NMFS concluded that the proposed action was not likely to jeopardize their continued existence.

NMFS issued a biological opinion on January 9, 2009, for proposed renourishment of Juno Beach in Palm Beach County, Florida (F/SER/2008/04413). NMFS authorized the nonlethal take of eight green sea turtles and the lethal take of one green sea turtle associated with the permanent loss of approximately 1.7 acres of nearshore hardbottom, which serves as foraging and resting habitat for juvenile green turtles. While it was NMFS' opinion that this project was likely to adversely affect green sea turtles, NMFS concluded that the proposed action was not likely to jeopardize their continued existence.

4.1.2 State or Private Actions

Vessel Activity
Private and commercial vessels, including fishing vessels, operating in the action area of this consultation also have the potential to interact with ESA-listed sea turtles. The effects of fishing vessels, recreational vessels, or other types of commercial vessels on listed sea turtles may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Commercial traffic and recreational pursuits can also adversely affect sea turtles through propeller and boat strikes. The Sea Turtle Stranding and Salvage Network (STSSN) includes many records of vessel interaction (propeller injury) with sea turtles where there are high levels of vessel traffic. The extent of the problem is difficult to assess because of not knowing whether

the majority of sea turtles are struck pre- or post-mortem. It is important to note that minor collisions with small vessels may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements.

Coastal Development
Beachfront development, lighting, and beach erosion control all are ongoing activities along the Florida coastline. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties are adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

State Fisheries
Commercial state fisheries are located in the nearshore habitat areas that comprise the action area. Recreational fishing from private vessels also occurs in the area. Observations of state recreational fisheries have shown that loggerhead sea turtles are known to bite baited hooks and frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

In August of 2007, NMFS issued a regulation (72 FR 43176, August 3, 2007) to require any fishing vessels subject to the jurisdiction of the United States to take observers upon NMFS's request. The purpose of this measure is to learn more about sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary.

4.1.3 Other Potential Sources of Impacts in the Environmental Baseline

Marine Debris and Acoustic Impacts
A number of activities that may indirectly affect listed sea turtles in the action area of this consultation include anthropogenic marine debris and acoustic impacts. Discarded or lost fishing lines or gear, intentional dumping or accidental loss of garbage by vessels, and debris associated with areas flooded by storms can be introduced into the marine environment. This debris may be ingested by turtles or turtles may become entangled in the debris. The magnitude of impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources.

Marine Pollution and Environmental Contamination
Sources of pollutants along the coastal areas include atmospheric loading of pollutants such as polychlorinated biphenyls (PCBs), stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, and groundwater and other discharges (Carpenter

et al, 1986). Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems (Bowen and Valiela, 2001; Rabalais 2002, Rabalais et al 2002). The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. Although these contaminant concentrations do not likely affect the more pelagic waters, the species of turtles analyzed in this biological opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). Mckenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtle tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). Dietary preferences were likely the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai et al. (1995) found the presence of metal residues occurring in loggerhead turtle organs and eggs. Storelli et al. (1998) analyzed tissues from twelve loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law et al. 1991).

4.1.4 Conservation and Recovery Actions Benefiting Sea Turtles in the Action Area

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic HMS and Gulf of Mexico reef fish fisheries, and TED requirements for the southeastern shrimp fisheries. These regulations have relieved some of the pressure on sea turtle populations.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. NMFS currently has a Section 6 agreement with the State of Florida .Recent benefits to sea turtles from this agreement include the results of recovery grants to Florida that provide better understanding of the distribution and habitat use of sea turtles in Florida waters, and characterization and assessment of stranded sea turtles with vessel-strike injuries in Florida (http://www.fmtphm.org/presentations/2012/09_50_Meylan.pdf).

Outreach and Education, Sea Turtle Entanglements, and Rehabilitation
NMFS and cooperating states have established an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts that collects data on dead sea turtles, and also rescues and rehabilitates any live stranded sea turtles.

Other Actions
A revised recovery plan for the loggerhead sea turtle was completed December 8, 2008 (NMFS and USFWS 2008). Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising other plans based upon the latest and best available information. Five-year status reviews have recently been completed for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time. However, further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended, to evaluate whether DPSs should be established for these species (NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e). The Services published a final rule on September 22, 2011, listing loggerhead sea turtles as separate DPSs.

Summary and Synthesis of Environmental Baseline for Sea Turtles
In summary, several factors adversely affect sea turtles in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action. Fisheries in the action area likely had the greatest adverse impacts on sea turtles in the mid to late 80s, when effort in most fisheries was near or at peak levels. With the decline of the health of managed species, effort since that time has generally been declining. Over the past five years, the impacts associated with fisheries have also been reduced through the Section 7 consultation process and regulations implementing effective bycatch reduction strategies. However, interactions with commercial and recreational fishing gear are still ongoing and are expected to occur contemporaneously with the proposed action. Other environmental impacts including effects of vessel operations, dredging, permits allowing take under the ESA, private vessel traffic, and marine pollution have also had and continue to have adverse effects on sea turtles in the action area in the past.

4.2 Status of Johnson’s Seagrass in the Action Area

Based on the results of the southern transect sampling, it appears there is a relatively continuous, although patchy, distribution of the species from Jupiter Inlet to Virginia Key, at least during periods of relatively good environmental conditions and no significant large-scale disturbances (NMFS 2007). The largest reported contiguous meadow of Johnson’s seagrass in the southern range was observed in Lake Worth Lagoon and was estimated to be 30 acres (Kenworthy 1997).

The USACE seagrass survey conducted for this project identified 14.6 acres of seagrass in the action area. Much of the area includes contiguous meadows of Johnson’s seagrass. The majority of the seagrass found in the action area will not be affected by the project. The USACE determined 4.5 acres of seagrass habitat would be affected by the proposed dredging. Since Johnson’s seagrass occurs throughout the areas to be dredged in various concentrations, and to be conservative, the entire 4.5 acres is considered to be Johnson’s seagrass habitat.

4.2.1 Factors Affecting Johnson’s Seagrass in the Action Area

A wide range of activities funded, authorized, or carried out by federal agencies may affect the essential habitat requirements of Johnson's seagrass. These include dredging, dock/marina construction, boat shows, bridge/highway construction, residential construction, and shoreline stabilization. Other federal actions (or actions with a federal nexus) that may affect Johnson’s seagrass include actions by the EPA and the USACE to manage freshwater discharges into waterways; regulation of vessel traffic by the USCG; management of protected species by the USFWS; and authorization of state coastal zone management plans by NOAA’s National Ocean Service. Although these actions have probably removed Johnson’s seagrass and affected its critical habitat, none of these past actions have jeopardized the continued existence of Johnson’s seagrass, or destroyed or adversely modified its critical habitat. The majority of these projects were single- or multi-family dock construction that resulted in a few hundred square feet of impacts to Johnson’s seagrass. The majority of the projects resulted in impacts to less than 0.1 acre of Johnson’s seagrass or its designated critical habitat. However, a few projects resulted in more significant impacts.

Coastal Construction
Dock construction and dredging within the action area has adversely affected Johnson’s seagrass and its habitat, through sedimentation, shading, changes to salinity and depth, and direct removal of the species.

Urban Development
Urban development since the 1960s has affected inshore water quality throughout the range of Johnson’s seagrass. However, Woodward-Clyde (1996) believed improvements in erosion and sediment control in association with urban development in the 1980s and 1990s may have been responsible for reduced turbidity in those decades as compared to the previous two decades of development. Reductions in seagrasses were apparent in the 1970s, along with areas of highly turbid water. Increases in submerged aquatic vegetation were noted until coverage and density peaked in 1986, albeit at levels remaining below those observed in the decades prior to 1960. In association with upland development, water quality and transparency within the range of

Johnson's seagrass are affected by storm water and agricultural runoff, wastewater discharges, and other point and non-point source discharges. The most clearly identified and manageable threat to the survival and recovery of Johnson's seagrass is the possibility of mortality due to reduced salinity over long periods of time (NMFS 2010). High-volume freshwater discharges from Lake Okeechobee flow downstream to the mouth of the St. Lucie River and have the potential to adversely affect Johnson's seagrass. The Comprehensive Everglades Restoration Plan (CERP) may help to alleviate the frequency of high-volume freshwater discharges from Lake Okeechobee.

Natural Disturbances
Large-scale weather events, such as tropical storms and hurricanes, while they often generate runoff conditions that decrease water quality, also produce conditions (wind setup and abrupt water elevation changes) that can increase flushing rates. The effects of storms can be complex. Specifically documented storm effects on healthy seagrass meadows have been relatively minor and include (1) scouring and erosion of sediments, (2) erosion of seeds and plants by waves, currents, and surge, (3) burial by shifting sand, (4) turbidity, and (5) discharge of freshwater, including inorganic and organic constituents in the effluents (Oppenheimer 1963, van Tussenbroek 1994, Whitfield et al. 2002, Steward et al. 2006). Storm effects may be chronic, e.g., due to seasonal weather cycles, or acute, such as the effects of strong thunderstorms or tropical cyclones. Studies have demonstrated that healthy, intact seagrass meadows are generally resistant to physical degradation from severe storms, whereas damaged seagrass beds may not be as resilient (Fonseca et al. 2000, Whitfield et al. 2002). In the late summer and early fall of 2004, four hurricanes passed directly over the northern range of Johnson's seagrass in the Indian River Lagoon. A post-hurricane random survey in the area of the Indian River Lagoon affected by the four hurricanes indicated the presence of Johnson's seagrass was similar to that reported by the SJRWMD transect surveys prior to the storms. This indicates that while the species may temporarily decline, under the right conditions it can recover quickly (Virnstein and Morris 2007). Furthermore, despite evidence of longer-term reductions in salinity, increased water turbidity, and increased water color associated with higher than average precipitation in the spring of 2005, there was no evidence of long-term chronic impacts to seagrasses and no direct evidence of damage to Johnson's seagrass that could be considered a threat to the survival of the species (Steward et al. 2006).

4.2.2 State and Federal Activities That May Benefit Johnson's Seagrass in the Action Area

State and federal conservation measures exist to protect Johnson's seagrass and its habitat under an umbrella of management and conservation programs that address seagrasses in general (Kenworthy et al. 2006). These conservation measures must be continually monitored and assessed to determine if they will ensure the long term protection of the species and the maintenance of environmental conditions suitable for its continued existence throughout its geographic distribution.

5 EFFECTS OF THE ACTION

Effects of the action include the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the baseline. Indirect effects are those that are caused by the proposed action and are later in time (i.e., occur after the action is complete), but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

The analysis in this section forms the foundation for our jeopardy analysis. The quantitative and qualitative analyses in this section are based upon the best available commercial and scientific data on species biology and the effects of the proposed action. Data are limited, so we are often forced to make assumptions to overcome the limits in our knowledge. Sometimes, different analytical approaches may be applied to the same data sets, and produce different results. In those cases, in keeping with the direction from the U.S. Congress to resolve uncertainty in favor of threatened and endangered species [House of Representatives Conference Report No. 697, 96th Congress, Second Session, 12 (1979)], we will generally select the value yielding the most conservative outcome (i.e., would lead to conclusions of higher, rather than lower, risk to endangered or threatened species).

5.1 Effects of the Action on Sea Turtles

In Section 3, we determined listed species of sea turtles likely to be adversely affected via any or all portions of the proposed action include green and loggerhead sea turtles. Potential routes of adverse effects of the proposed action on sea turtles are limited to hopper dredging, which are discussed below.

Hopper Dredging
The EIS has stated that hopper dredging may be conducted during this project. As discussed above, hopper dredges have been documented as capturing, injuring and killing sea turtles. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the drag arm of the moving dredge overtakes the slower moving sea turtle. During hopper dredging operations, protected species observers will live aboard the dredge(s), monitoring every dredge haul 24 hours a day, for evidence of dredge related impacts to protected species, particularly sea turtles. Additionally, rigid turtle deflectors will be installed on the dragheads before work begins and all points of inflow will be screened. Cages will be attached to the ends of discharge pipes, be constructed of steel bar-stock, and welded in a grid pattern with openings approximately 4-in x 4-in. Observers will clean and inspect these screens, 24-hours a day, to document any evidence of sea turtle interactions by looking for sea turtle body parts. Observers will also maintain a bridge watch for protected species and keep a logbook noting the date, time, location, species, number of animals, distance and bearing from dredge, direction of travel, and other information, for all sightings. During all phases of dredging operations, the dredge and crew will be required to adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*.

NMFS has determined that dredged material screening is only partially effective, and observed interactions likely provide only partial estimates of total sea turtle mortality. NMFS believes that some turtles killed by hopper dredges go undetected because body parts are forced through the sampling screens by water pressure and are buried in the dredged material, or animals are crushed or killed but their bodies or body parts are not entrained by the suction and so the interactions may go unnoticed. Mortalities are only noticed and documented when body parts float, are large enough to be caught in the screens, and can be identified as sea turtle parts. Body parts that are forced through the 4-inch (or greater) inflow screens by the suction-pump pressure and that do not float are very unlikely to be observed, since they will sink to the bottom of the hopper and not be detected by the overflow screening. Unobserved interactions are not documented, thus, observed interactions may under-represent actual lethal interactions. It is not known how many turtles are killed but unobserved. Thus, to be conservative, in the Regional Biological Opinion prepared for the Gulf region, NMFS estimated that up to one out of two impacted turtles may go undetected (i.e., that observed interactions constitute only about 50 percent of total takes). We will apply this conservative analysis in the present opinion, since we have no new information that would change the basis of that previous conclusion and estimate.

Based on the results of 20 years of previous maintenance dredging events in Palm Beach Harbor, during which eight loggerhead and three green sea turtles have been taken by hopper dredging, NMFS anticipates that only green and loggerhead sea turtles will be observed and documented as taken by hopper dredging operations associated with this project. *We estimate incidental take, by injury of mortality, will consist of one green sea turtle (three turtles divided by 20 years – rounded up to one) and one loggerhead sea turtle (eight turtles divided by 20 years – rounded up to one) being observed (and counted) by onboard protected species observers as lethally taken during hopper dredging in Palm Beach Harbor.* This estimate is based on the use of hopper dredges for the entire duration of the project and represents mortality *detected* by onboard observers. As previously discussed, we estimate that for every turtle observed, another will go undetected, thus not documented. Our jeopardy analysis will account for total takes (observed takes plus undetected takes).

Our Incidental Take Statement (ITS), is based on observed takes, not only because observed mortality gives us an estimate of unobserved mortality, but because observed, documented take numbers serve as triggers for some of the reasonable and prudent measures, and for potential reinitiation of consultation if actual observed takes exceed the anticipated/authorized number of observed takes.

Experience has shown that the vast majority of hopper-dredge impacted turtles are immediately crushed or dismembered by the violent forces they are subjected to during entrainment. A very few turtles (over the years, a fraction of a percent) survive entrainment in hopper dredges, usually smaller juveniles that are sucked through the pumps without being dismembered or badly injured. Often they will appear uninjured only to die days later of unknown internal injuries, while in rehabilitation. Therefore, we are conservatively predicting that all takes by hopper dredges will be lethal.

5.2 Effects of the Action on Johnson's Seagrass

NMFS believes the proposed action is likely to adversely affect Johnson's seagrass, which is listed as threatened under the ESA. Take resulting from the proposed action is not legally prohibited, and no incidental take statement or reasonable and prudent measures will be issued. However, because the action will result in adverse effects to Johnson's seagrass, we must evaluate whether the action is likely to jeopardize the continued existence of the species.

Direct effects to Johnson's seagrass are associated with the various dredging actions that will excavate approximately 4.5 acres of seagrass habitat, which includes Johnson's seagrass as a monoculture or mixed with other species of seagrass. To be conservative, we will assume that the entire 4.5 acres to be removed will consist of Johnson's seagrass.

6 CUMULATIVE EFFECTS

Cumulative effects include the effects of *future* state, tribal, or local private actions – i.e., that are not already in the baseline -- that are reasonably certain to occur in the action area considered in this opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA (50 CFR 402.14). Actions that are reasonably certain to occur would include actions that have some demonstrable commitment to their implementation, such as funding, contracts, agreements or plans.

Within the action area, major future changes are not anticipated in ongoing human activities described in the environmental baseline. The present human uses of the action area, such as commercial shipping, boating, and fishing, are expected to continue, though some may occur at increased levels, frequency or intensity in the near future as are their associated risks of injury or mortality to sea turtles posed by incidental capture by fishermen, vessel collisions, marine debris, chemical discharges, and man-made noises. NMFS is not aware of any state, tribal or local private action that is reasonably certain to occur in the future in the action area.

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of affected ESA-listed sea turtles and Johnson's seagrass. In Section 5, we outlined how the proposed action can affect sea turtles and Johnson's seagrass and the extent of those effects in terms of estimates of the numbers of each species expected to be killed or acreage of seagrass destroyed. Now we turn to an assessment of each species' response to this impact, in terms of overall population effects from the estimated take, and whether those effects of the proposed action, when considered in the context of the status of the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of the affected species.

It is the responsibility of the action agency to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species…" (ESA Section 7(a)(2)). Action agencies must consult with and seek assistance from the Services to meet this responsibility. The Services must ultimately determine in a biological opinion whether the action jeopardizes listed species. "To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in making this determination, NMFS must look at whether the action directly or indirectly reduces the reproduction, numbers, or distribution of a listed species. Then, if there is a reduction in one or more of these elements, we evaluate whether it would be expected to cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

In the following section we evaluate the responses of green sea turtles, loggerhead sea turtles, and Johnson's seagrass to the effects of the action. We find that although some reduction in numbers and reproduction is expected for sea turtles species, the anticipated take of green and loggerhead sea turtles will not appreciably reduce the likelihood of survival increase the risk of extinction of these species in the wild, or appreciably interfere with achieving recovery objectives for the species.

7.1 Effect of the Action on Green Sea Turtles' Likelihood of Survival and Recovery in the Wild

The potential lethal take of two green sea turtles (one observed and one unobserved) by hopper dredge is a reduction in numbers. These lethal takes would also result in a potential reduction in future reproduction, assuming some individuals would be females and would have survived otherwise to reproduce. All life stages are important to the survival and recovery of sea turtles; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, the take of male juveniles may affect survivorship and recruitment rates into the reproductive population in any given year, and yet not significantly reduce the reproductive potential of the population. A very low percent of hatchlings is typically expected to survive to reproductive age. The death of mature, breeding females can have an immediate effect on the reproductive rate of the species. Sub-lethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Different age classes may experience varying rates of mortality and resilience. Further, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every two to four years, with 110-115 eggs/nest of which a small percentage is expected to survive to sexual maturity. Green sea turtles are highly migratory, and individuals from all Atlantic nesting populations may range throughout the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. Because all the potential interactions are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of green sea turtles in the action area is expected to be unaffected.

To be conservative, we assume that the green sea turtles that will be taken will be reproductive females, with a higher potential impact on the species relative to take of other stages. If the take is of a reproducing female, it is likely that such a turtle is part of the Florida population (female returning to nesting beach).

This species is currently showing a very large increasing nesting trend in Florida, with nesting numbers already approaching or exceeding those required by the recovery plan for the species. Therefore, we believe that the reduction in numbers and reproduction as a result of the lethal take is not expected to appreciably reduce the likelihood of survival of green sea turtles in the wild.

We also considered the recovery objectives in the recovery plan prepared for the U.S. populations of green sea turtles that may be affected by the predicted reduction in numbers and reproduction. The recovery plan for green sea turtles (NMFS and USFWS 1991) lists the following relevant recovery objectives relevant to the effects of the proposed action:

The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years. Nesting data must be based on standardized surveys. Between 2001 and 2006, an average of 5,039 green turtle nests were laid annually in Florida, with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a). That average increased to 7,436 nests per year for the 6-year period of 2004-2009. Data from the index nesting beach program in Florida support the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008, but that is thought to be part of the normal biennial nesting cycle for green turtles (FWC Index Nesting Beach Survey Database). An additional drop to just below 3,000 nests was seen on the index nesting beaches in 2009, but the occasional break from the normal biennial pattern is not without precedent, as there were two consecutive years of increase from 2003-2005 (FWC Index Nesting Beach Survey Database). State nesting data for 2011 show an increase in green turtle nests to 10,701, the highest number of nests since 1988 (FWRI Web site: http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/).

A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds. Currently, there are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida, show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years (FPL 2002). Ehrhart et al. (2007) has also documented a significant increase in in-water abundance of green turtles in the Indian River Lagoon area.

The lethal take of two turtles will result in a reduction in numbers and reproduction, but will not have any detectable influence on the population and nesting trends noted above. The loss of two individuals will not have an appreciable impact on total recruitment of new sea turtles to the population given the extent of the impact versus the very rapid population increases occurring over the past decade. Thus, the proposed action will not interfere with achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

7.2 Effect of the Action on Loggerhead Sea Turtles' Likelihood of Survival and Recovery in the Wild

The potential lethal take of two loggerhead sea turtles (one observed and one unobserved) by hopper dredge is a reduction in numbers. These lethal takes would also result in a reduction in reproduction as a result of lost reproductive potential, as some of these individuals would be females who would have survived other threats and reproduced in the future, thus eliminating each female individual's contribution to future generations. All life stages are important to the survival and recovery of sea turtles; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, the take of male juveniles may affect survivorship and recruitment rates into the reproductive population in any given year, and yet not significantly reduce the reproductive potential of the population. A very low percent of hatchlings is typically expected to survive to reproductive age. The death of mature, breeding females can have an immediate effect on the reproductive rate of the species. Sub-lethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Different age classes may experience varying rates of mortality and resilience. Further, an adult female loggerhead sea turtle can lay three or four clutches of eggs every two to four years, with 100 to 130 eggs per clutch. The annual loss of adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. A reduction in the distribution of loggerhead sea turtles is not expected from lethal takes during the proposed action. Because all the potential interactions are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether or not the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends, i.e., whether the estimated reductions, when viewed within the context of the environmental baseline and status of the species, are of such an extent that adverse effects on population dynamics are appreciable. In Section 3.2.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling [i.e., (Conant et al. 2009; NMFS-SEFSC 2009d)]. Below we synthesize what that information means in general terms and also in the more specific context of the proposed action.

Loggerhead sea turtles are a slow growing, late-maturing species. Because of their longevity, loggerhead sea turtles require high survival rates throughout their life to maintain a population. In other words, late-maturing species cannot tolerate much anthropogenic mortality without going into decline. Conant et al. (2009) concluded loggerhead natural growth rates are small; natural survival needs to be high; and even low to moderate mortality can drive the population into decline. Because recruitment to the adult population is slow, population modeling studies suggest even small increased mortality rates in adults and sub-adults could substantially impact population numbers and viability (Chaloupka and Musick 1997; Crouse et al. 1987; Crowder et al. 1994; Heppell et al. 1995).

The best available information indicates that the NWA loggerhead DPS is still large, but is possibly experiencing more mortality than it can withstand. All of the results of population models in both NMFS SEFSC (2009d) and Conant et al. (2009) indicated western North Atlantic loggerheads were likely to continue to decline in the future unless action was taken to reduce anthropogenic mortality. With the inclusion of newer nesting data beyond the 2007 data used in those analyses, the status of loggerhead nesting is beginning to show improvement. As previously described in the Status of the Species section, in 2008 nesting numbers were high, but not enough to change the negative trend line. Nesting dipped again in 2009, but rose substantially in 2010. With the addition of data through 2010, the nesting trend for the NWA DPS of loggerheads is only slightly negative and not statistically different from zero (no trend) (NMFS and USFWS 2010). Additionally, although the best fit trend line is slightly negative, the range from the statistical analysis of the nesting trend includes both negative and positive growth (NMFS and USFWS 2010). The 2011 nesting was on par with 2010, providing further evidence that the nesting trend may have stabilized and the 2012 index nesting number was the largest since 2000.

To be conservative, we assume that the loggerhead sea turtles that will be taken will be reproductive females, with a higher potential impact on the species relative to take of other stages.

NMFS SEFSC (2009d) estimated the minimum adult female population size for the western North Atlantic in the 2004-2008 time frame to likely be between 20,000 to 40,000 (median 30,050) individuals, with a low likelihood of being as many as 70,000 individuals. Estimates were based on the following equation: Adult females = (nests/(nests per female)) x remigration interval. The estimate of western North Atlantic adult loggerhead female was considered conservative for several reasons. The number of nests used for the western North Atlantic was based primarily on U.S. nesting beaches. Thus, the results are a slight underestimate of total nests because of the inability to collect complete nest counts for many non-U.S. nesting beaches. In estimating the current population size for adult nesting female loggerhead sea turtles, NMFS SEFSC (2009d) simplified the number of assumptions and reduced uncertainty by using the minimum total annual nest count over the relevant five year period (2004-2008) (i.e., 48,252 nests). This was a particularly conservative assumption considering how the number of nests and nesting females can vary widely from year to year (cf., 2008's nest count of 69,668 nests, which would have increased the adult female estimate proportionately, to between 30,000 and 60,000). In addition, minimal assumptions were made about the distribution of remigration intervals and nests per female parameters, which are fairly robust and well known parameters. Florida's long-term loggerhead nesting data (1989-2012) has shown three distinct trends. Following a 23 percent increase between 1989 and 1998, nest counts declined sharply for over a decade. During the period between the high-count nesting season in 1998 and the most recent (2012) nesting season, researchers found no demonstrable trend, indicating a reversal of the post-1998 decline. The overall change in counts from 1989 to 2012 is positive. Nest counts in 2012, corrected for subtle variation in survey effort, were slightly below the high nest count recorded in 1998.

Based on the total numbers of adult females estimated by NMFS SEFSC for the western North Atlantic population of loggerhead sea turtles, the anticipated lethal take of two loggerheads – in the extremely unlikely worst case that both are female and adult –resulting from the proposed action would represent the removal of approximately 0.006 percent ([2/30,000] x 100) of the estimated adult loggerhead female population. These removals are very small and contribute only minimally to the overall mortality on the population. Further, these percentages are likely an overestimation of the impact of the anticipated lethal take resulting from the proposed project on loggerhead sea turtles for the following reason. These percentages represent impacts to adult female loggerhead sea turtles only, and not to the population as a whole. Because this estimated contribution to mortality is a tiny part of our range of uncertainty across what total mortality might be for loggerhead sea turtles, we believe that the small effect posed by the lethal take resulting from the proposed project will not result in a detectable or appreciable reduction in the species' likelihood of survival in the wild.

We also considered the recovery objectives in the recovery plan prepared for the U.S. populations of loggerhead sea turtles that may be affected by the predicted reduction in numbers and reproduction. The Services' recovery plan for the Northwest Atlantic population of the loggerhead turtle (NMFS and USFWS 2009), which is in essence the same population of turtles as comprise the NWA DPS, provides explanation of the goals and vision for recovery for this population. The objectives of the recovery plan most pertinent to the threats posed by dredging associated activities are numbers 11 and 13:

11. Minimize trophic changes from fishery harvest and habitat alteration…
13. Minimize vessel strike mortality.

As discussed above, the proposed action will remove several acres of foraging habitat for sea turtles; however, the project area is surrounded by abundant seagrass meadows and the channel slopes will be recolonized by epifauna and flora once the dredging has concluded. Therefore, there will be insignificant effects from permanent loss of habitat that may have been used for foraging by sea turtles. Thus, the action will not interfere with achieving recovery objective 11. The take predicted from the action is entrainment of turtles by hopper dredges and thus does not constitute vessel strike mortality as envisioned in the recovery plan. Further, the proposed action is expected to reduce the level of vessel traffic using the inlet and harbor (fewer, larger vessels are anticipated). Further, since some of the larger vessels are already coming in at high tide with the narrow channels, there is a greater chance of turtles being struck since turtles don't have adequate room to move away from an oncoming ship. The widening and deepening should help to provide more room for turtles to avoid ships. Thus, the proposed action will not interfere with achieving recovery objective 13.

The recovery plan anticipates that, with implementation of the plan, the western North Atlantic population will recover within 50 to 150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the declining trends of the Northern, Peninsular Florida, and Northern Gulf of Mexico Recovery Units. The potential lethal take of two loggerheads during the project will result in reduction in numbers when take occurs and possibly by lost future reproduction, but given the magnitude of these trends and likely large absolute population size, it is unlikely to have any detectable influence on the population objectives and trends noted above. Loggerhead nest counts on Florida's index beaches have declined from a peak of nearly 60,000 in 1998. However, 2011 counts were close to the average of the previous five years. Although this may be the beginning of a stabilizing trend, additional good nesting years will be required to reverse the preceding decline (FWRI Web site: http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/).

Thus, the proposed action will not interfere with achieving the recovery objectives and will not result in an appreciable reduction in the likelihood of loggerhead sea turtles' recovery in the wild.

7.3 Effect of the Action on Johnson's Seagrass Likelihood of Survival and Recovery in the Wild

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of Johnson' s seagrass. In the previous section, we analyzed the effects of the action on Johnson' s seagrass. Now we turn to an assessment of the species response to these effects, in terms of overall population effects, and whether those effects of the proposed action, when considered in the context of the status of the species, the environmental baseline, and the cumulative effects, will jeopardize the continued existence of Johnson' s seagrass.

To jeopardize the continued existence of' means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in making this determination, we must first determine whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

The estimated loss of up to 4.5 acres of Johnson' s seagrass due to the proposed action is a conservative, reasonable worst-case scenario. The actual amount is likely much lower, but no recent percent coverage estimates were provided that could be used to calculate the actual acreage of Johnson's seagrass. In terms of the edges of the action area, NMFS believes Johnson's seagrass is likely to recolonize some of the area after the dredging is complete based on its life history strategy (i.e., it effectively out - competes other seagrass species in periodically disturbed areas, Durako et al. 2003) in the shallow depth of the dredging area (i.e., less than 12 feet, which is within its known depth range). The loss of 4.5 acres of Johnson's seagrass is a reduction in numbers of the species. However, in terms of adverse effects on a larger, population scale, the Johnson' s Seagrass Recovery Team determined that effects of dredging and filling activities are generally local and small -scale in nature and are not considered threats to the survival and recovery of the species because these activities will not individually or cumulatively result in the long -term, large -scale mortality of Johnson' s seagrass, particularly in light of its "pulsating patches" life history strategy, discussed above . Thus, the loss of up to 4.5 acres of Johnson' s seagrass will not result in long -term mortality either in the immediate action area or on a larger scale, including the large meadow of the species in Lake Worth Lagoon.

Reproduction will be temporarily reduced by the up to 4.5-acre reduction in Johnson' s seagrass numbers, but NMFS considers that this reproductive loss does not appreciably reduce the likelihood of survival of Johnson' s seagrass in the wild. Johnson' s seagrass will continue to reproduce and spread because the proposed impacts are expected to be temporary (i.e., Johnson' s seagrass is likely to recolonize the shallow areas and persist in some areas of the action area after the dredging is complete).

The proposed action will not result in a complete reduction of Johnson' s seagrass distribution or fragmentation of the range since we expect Johnson' s seagrass will recolonize the shallow areas and will continue to be capable of spreading via asexual fragmentation. Therefore, the reproductive potential of the species in the action area, and in this portion of its range, will persist.

Recovery for Johnson' s seagrass, as described in the recovery plan, will be achieved when the following recovery objectives are met: (1) the species' present geographic range remains stable for at least 10 years, or increases; (2) self -sustaining populations are present throughout the range at distances less than or equal to the maximum dispersal distance to allow for stable vegetative recruitment and genetic diversity; and (3) populations and supporting habitat in its geographic range have long -term protection (through regulatory action or purchase acquisition).

NMFS believes that the proposed action will not appreciably reduce the likelihood of recovery of Johnson' s seagrass in the wild. NMFS' s recent (2007) five-year review of the status of the species concluded that the first recovery objective has been achieved. In fact, the range has increased slightly northward. The proposed action will not impact the status of this objective. Self - sustaining populations are present throughout the range of the species. The species' overall reproductive capacity will be only minimally reduced by the reduction in Johnson' s seagrass numbers and reproduction resulting from the action. The proposed dredging will not lead to separation of self -sustaining Johnson' s seagrass patches to an extent that might lead to adverse effects to one or more patches of the species. Similarly, the availability of suitable habitat in which the species can spread/flow in the future will not be adversely affected by the proposed action. While additional individual impacts may continue to occur, over the last decade the species has not demonstrated any declining trends. The proposed action will not reduce or destabilize the present range of Johnson' s seagrass. Therefore, the project will not appreciably reduce the likelihood of recovery of Johnson' s seagrass in the wild.

8 CONCLUSION

Green and Loggerhead Sea Turtles

Using the best available data, we analyzed the effects of the proposed action in the context of the status of the species, the environmental baseline, and cumulative effects, and determined that the proposed action is not likely to jeopardize the continued existence of green or the NWA DPS of loggerhead sea turtles. These analyses focused on the impacts to, and population responses of, sea turtles in the Atlantic basin. However, the impact of the effects of the proposed action on Atlantic sea turtle populations must be extrapolated to impacts to green sea turtles throughout its global range, as the species is listed. Because the proposed action will not reduce the likelihood of survival and recovery of Atlantic populations of green sea turtles, it is our opinion that the proposed action is not likely to jeopardize the continued existence of the species.

Johnson's Seagrass

NMFS has analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of Johnson's seagrass. Because the proposed action will not reduce the likelihood of survival and recovery of Johnson's seagrass, it is our opinion that the proposed action is also not likely to jeopardize the continued existence of the species.

9 INCIDENTAL TAKE STATEMENT (ITS)

Section 9 of the ESA and protective regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the RPMs and terms and conditions of the ITS.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under Section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is expected or has been authorized under Section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided, and no take is authorized. Nevertheless, the USACE must immediately notify (within 24 hours, if communication is possible) NMFS's Office of Protected Resources should a take of a listed marine mammal occur.

9.1 Effect of the Take

NMFS has determined the anticipated incidental take of two green sea turtles and two loggerhead sea turtles is not likely to jeopardize the continued existence of green sea turtles or loggerhead sea turtles.

9.2 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states the RPMs necessary to minimize the impacts of take and the terms and conditions to implement those measures, must be provided, and must be followed to minimize those impacts. Only incidental taking by the federal agency that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required, by 50 CFR 402.01(i)(1)(ii) and (iv), to document the incidental take by the proposed action and to minimize the impact of that take on ESA-listed species. These measures and terms and conditions are nondiscretionary, and must be implemented by the USACE in order for the protection of Section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACE fails to adhere to the terms and conditions through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles during the proposed action. The RPMs that NMFS believes are necessary to minimize the impacts of the proposed hopper dredging have been discussed with the USACE in the past and are standard operating procedures, and include the use of intake and overflow screening, use of sea turtle deflector dragheads, observer and reporting requirements, and relocation trawling. The following RPMs and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. Experience has shown that injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal.

1. Take Monitoring and Reporting: Observer Requirements and Dredged Material Screening

NMFS-approved observers monitor dredged material inflow and overflow screening baskets on many projects; however, screening is only partially effective; and observed, documented takes provide only partial estimates of total sea turtle mortality. NMFS believes that some listed species taken by hopper dredges go undetected because body parts are forced through the sampling screens by the water pressure and are buried in the dredged material, or animals are crushed or killed but not entrained by the suction and so the takes may go unnoticed. The only mortalities that are documented are those where body parts either float, are large enough to be caught in the screens, and/or can be identified as from sea turtle species. However, this opinion estimates that with 4-inch inflow screening in place, and 24-hour, 100-percent observer coverage, observers will probably detect and record 50 percent of turtle mortality. Additionally, coordination with local sea turtle stranding networks can be a valuable adjunct monitoring method; not to directly monitor takes, but to help ensure that unanticipated impacts to sea turtles are not occurring.

2. Deflector Dragheads

V-shaped, sea turtle deflector dragheads prevent an unquantifiable yet significant number of sea turtles from being entrained and killed in hopper dredges each year. Without them, turtle takes during hopper dredging operations would unquestionably be higher. Draghead tests conducted in May-June 1993 by the USACE's Waterways Experimental Station (WES), now known as the Engineering Research and Development Center (ERDC), in clear water conditions on the sea floor off Fort Pierce, Florida, with 300 mock turtles placed in rows, showed convincingly that the newly-developed WES deflector draghead "performed exceedingly well at deflecting the mock turtles." Thirty-seven of 39 mock turtles encountered were deflected, two turtles were not deflected, and none were damaged. In addition, "the deflector draghead provided better production rates than the unmodified California draghead, and the deflector draghead was easier to operate and maneuver than the unmodified California flat-front draghead." The V-shape reduced forces encountered by the draghead and resulted in smoother operation. V-shaped deflecting dragheads are now a widely accepted conservation tool, the dredging industry is familiar with them and their operation, and they are used by all USACE Districts conducting hopper dredge operations where turtles may be present.

9.3 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are nondiscretionary.

1. Observers (RPM 1): The USACE shall arrange for NMFS-approved protected species observers to be aboard the hopper dredges to monitor the hopper bin, screening, and dragheads for sea turtles and their remains. Observer coverage sufficient for 100 percent monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges throughout the proposed project.

2. Screening (RPM 1): 100 percent inflow screening of dredged material is required and 100 percent overflow screening is recommended. If conditions prevent 100 percent inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100 percent overflow screening is then required.

   a. Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the Jacksonville District, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased, for example, to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Other variations in screening size are allowed, with prior written approval by NMFS. Clogging should be significantly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100 percent overflow 4-inch screening is mandatory. The USACE shall notify NMFS beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

   b. Need for Flexible, Graduated Screens: NMFS believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

3. Dredging Pumps (RPM 2): Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

4. Sea Turtle Deflecting Draghead (RPM 2): A state-of-the-art rigid deflector draghead must be used on all hopper dredges at all times. Alternate draghead designs shall not be used unless prior, written approval is given by NMFS.

5. Dredge Take Reporting and Final Report (RPM 1): Observer reports of incidental take by hopper dredges or bed-levelers must be faxed to NMFS's Southeast Regional Office (phone: 727/824-5312, fax: 727/824-5309), and reported by electronic mail to **takereport.nmfsser@noaa.go**v by onboard NMFS-approved protected species observers, the dredging company, or the USACE within 24 hours of any sea turtle or other listed species take observed. This biological opinion shall be referenced by title, date, and PCTS consultation number (SER-2012-2743)

   A final report summarizing the results of the hopper dredging and any documented sea turtle or other listed species takes must be submitted to NMFS within 30 working days of completion of the dredging project. Reports shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken, screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the Jacksonville District deems relevant.

6. Sea Turtle Strandings (RPM 1): The Jacksonville District Project Manager or designated representative shall notify the STSSN state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and bed-leveler operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment, or interaction with bed-leveling equipment.

   Information on any such strandings shall be reported in writing within 30 days of project end to NMFS's Southeast Regional Office. Because the deaths of these turtles have already been accounted for in NMFS's jeopardy analysis, the strandings will not be counted against the USACE's take limit.

7. Reporting Strandings (RPM 1): The USACE shall provide NMFS's Southeast Regional Office with a report detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment and/or bed-leveler interactions.

8. PIT-Tag Scanning and Data Submission Requirements (RPM 1): All sea turtles captured by dredges shall be thoroughly scanned for the presence of PIT tags using a multi-frequency scanner powerful enough to read multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and read tags deeply embedded in muscle tissue (e.g., manufactured by Trovan, Biomark, or Avid). Sea turtle data collected (PIT tag scan data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All sea turtle data collected shall be submitted in electronic format within 60 days of project completion to Lisa.Belskis@noaa.gov.

9. Requirement and Authority to Conduct Tissue Sampling for Genetic and Contaminants Analyses (RPM 1): This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a hopper dredge to tissue-sample captured sea turtles without the need for an ESA Section 10 permit.

   All sea turtles captured by hopper dredging (for both USACE-conducted and USACE-permitted activities) shall be tissue-sampled. Sampling shall continue uninterrupted until such time as NMFS determines and notifies the USACE in writing.

   Sea turtle tissue samples shall be taken in accordance with NMFS's SEFSC procedures for sea turtle genetic analyses, and, as specified, for contaminants (e.g., heavy metals) analyses. Protocols for tissue sampling to be utilized in contaminants analyses are currently being developed by Dr. Dena Dickerson, ERDC. The USACE shall ensure that tissue samples taken during the dredging project are collected and stored properly and mailed every three months until completion of the dredging project to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149.

10. Training Personnel on Hopper Dredges (RPM 1): The USACE must ensure that all contracted personnel involved in operating hopper dredges (whether privately-funded or federally-funded projects) receive thorough training on measures of dredge operation that will minimize takes of sea turtles. It shall be the goal of the hopper dredging operation to establish operating procedures that are consistent with those that have been used successfully during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, USACE Engineering Research and Development Center experts or other persons with expertise in this matter shall be involved both in dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

11. Dredge Lighting (RPM 1): All lighting aboard hopper dredges and hopper dredge pumpout barges operating within three nautical miles of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All nonessential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female

sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

12. Best Management Practices (RPM 1): The USACE will be required to conduct activities in compliance with NMFS's March 23, 2006, *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Appendix D), except that Condition "e" shall not apply to the hopper dredging operations as it is impracticable to require a hopper dredge to stop all forward movement whenever a sea turtle is sited closer than 50 feet on the surface.

10 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat to help implement recovery plans or to develop information.

NMFS believes the following conservation recommendations are reasonable, necessary, and appropriate to conserve and recover Johnson's seagrass. NMFS strongly recommends that these measures be considered and adopted.

1. NMFS recommends that a report of all current and proposed USACE projects in the range of Johnson's seagrass be prepared and used by the USACE to assess impacts on the species from these projects, to assess cumulative impacts, and to assist in early consultation that will avoid and/or minimize impacts to Johnson's seagrass and its critical habitat. Information in this report should include location and scope of each project and identify the federal lead agency for each project. The information should be made available to NMFS.

2. NMFS recommends that the USACE conduct and support research to assess trends in the distribution and abundance of Johnson's seagrass. Data collected should be contributed to the Florida Fish and Wildlife Conservation Commission's Florida Wildlife Research Institute to support ongoing GIS mapping of Johnson's and other seagrass distribution.

3. NMFS recommends that the USACE, in coordination with seagrass researchers and industry, support ongoing research on light requirements and transplanting techniques to preserve and restore Johnson's seagrass, and on collection of plants for genetics research, tissue culture, and tissue banking.

4. NMFS recommends that the USACE prepare an assessment of the effects of other actions under its purview on Johnson's seagrass for consideration in future consultations.

5. NMFS recommends that the USACE promote the use of the October 2002, *Key for Construction Conditions for Docks or other Minor Structures Constructed in or over Johnson's Seagrass* as the standard construction methodology for proposed docks located in the range of Johnson's seagrass.

6. NMFS recommends that the USACE review and implement the recommendations in the July 2008 report, *The Effects of Docks on Seagrasses, With Particular Emphasis on the Threatened Seagrass, Halophila johnsonii* (Landry et al. 2008).

7. NMFS recommends that the USACE review and implement the Conclusions and Recommendations in the October 2008 report, *Evaluation of Regulatory Guidelines to Minimize Impacts to Seagrasses from Single-Family Residential Dock Structures in Florida and Puerto Rico* (Shafer et al. 2008).

11 REINITIATION OF CONSULTATION

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) The amount or extent of taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of take is exceeded, USACE must immediately request reinitiation of formal consultation.

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Appendix A.

South Atlantic Division Corps of Engineers
Hopper Dredging Protocol for Atlantic Coast
FY 98 - FY 03

1. Sea turtle deflecting dragheads will be used at all times.

2. Districts will inspect sea turtle deflecting dragheads systems to ensure that they are fully operational, prior to initiation of work.

3. Districts will ensure that draghead operators know how to properly use the sea turtle deflecting system.

4. Maintenance dredging at Savannah, Brunswick and Kings Bay Harbors must be restricted to 15 December through the end of March. Maintenance dredging at Charleston and Wilmington Harbors must be restricted to 1 December through the end of March where the sea turtle deflecting draghead system can not be used effectively. Dredging may begin as soon as mid-November in those portions of the Wilmington and Charleston Harbor channels where the sea turtle deflecting draghead can be used effectively. All Districts will cooperate to ensure that their scheduling of hopper dredging contracts, does not interfere with this Division priority work area.

5. Sea turtle observers, inflow screens and overflow screens will be used during all dredging operations, except for the months of January and February, which are optional. Variations from this provision may be granted by Division, but must be justified from a technical perspective.

6. All sea turtle takes will be reported promptly to SAD-ET-CO/PD and posted at usace.sad.turtle newsgroup on the Internet.

7. If two sea turtle takes occur within 24 hours, you should immediately notify the Division POC so that he can initiate reconsultation with National Marine Fisheries Service.

8. If a third take occurs on the project the district will cease operations and notify the South Atlantic Division. Continuation of dredging will occur only after cleared by Division. Upon taking three turtles, District will develop a risk assessment along with an appropriate risk management plan, and submit that to Division for assessment. Generally relative abundance and relocation trawling would be an integral part of a risk assessment and management plan. Should a total take of 5 sea turtles occur, for whatever reason, all work will be terminated unless other prior agreements had been reached with Division.